DECEMBER 4, 1941

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This Week in . . .

THE IRON AGE

Editorial

Technical Articles

Features

News and Markets

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THE IRON AGE

November 27, 1941

Allocations and Priorities Section

What Priorities Mean—Which Forms to Use

HOW TO USE THIS GUIDE—The following information is given in this guide:

1—An index alphabetically arranged listing all material and equipment in the metal working industry affected by government price, priority or allocation orders. Following each subject is a list of orders relating to the item. For details of the type of control in force refer to the orders indicated. (Page 1.)

2—A list of priority orders issued to date, together with a description of the order, the official forms to be used in connection with the order, and a description of the method to be used in extending the rating granted by the order. (Page 3.)

3—A tabulation, alphabetically arranged, of preference ratings granted by the various preference orders. (Page 9.)

4—A detailed explanation of how to extend priority orders, to be used in connection with item 2 above. (Page 8.)

5—A list of OPA price ceilings affecting the metal working industry. (Page 5.)

6—A description of the forms to be used with the priority orders. (Page 6.)

7—A table telling when and by whom the various forms affecting the metal industry should be filed. (Page 10.)

8—Names and addresses of priority specialists in Washington for various commodities. (Page 12.)

9—Locations and names of managers of all priority field offices established to date. (Page 12.)

DEFINITION OF TYPES OF ORDERS—M-Orders—Indicated by letter M preceding the serial number. These orders are designed to regulate the distribution of a material to assure defense needs being filled first, then other uses in the sequence of their importance. These orders can place all shipments under the control of the Priorities Director; set up an emergency pool and allow balance of output go free, or control usage through rate of production.

P-Orders—Indicated by letter P preceding serial number. These are intended to give buyers, users, or manufacturers of defense or essential civilian needs preference over ordinary civilian requirements in procurement of material for the specified products.

E-Orders—Identified by letter E. These are designed to regulate the distribution of equipment, as contrasted with M orders which regulate the flow of material.

L-Orders—Identified by letter L. These orders restrict production of specified products and materials and set permissible output schedules.

S-Orders—Identified by letter S. These suspend a plant's operations completely for a given period. Only one issued to date.

Price Orders—These orders, indicated by the letters PS in the index following, establish maximum prices at which various items may be sold. They do not set a minimum.

Miscellaneous orders—These cover special conditions which do not lend themselves to control by the regular orders.

Index to Material and Equipment

(Symbols P, M, L and E refer to priority orders; PS indicates a price schedule)

HOW TO MAKE REVISIONS

Revisions for this IRON AGE Priorities Guide will be given to you each week in THE IRON AGE. They will be found on the Priorities and Prices page, which appears in every issue. This guide replaces other priority sections and charts appearing in THE IRON AGE previous to the issue of Nov. 27.

THE IRON AGE, 100 E. 42nd St., New York, N. Y.

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Description of Priority Orders

(See "FORMS TO USE WITH PRIORITY ORDERS," page 6, for description of forms listed under column Related Form. For information on ratings assigned by these orders, see page 9. See section "HOW TO EXTEND PRIORITY ORDERS TO SUPPLIERS," page 8, for explanation of key letters under column How Extended. Numbers in brackets refer to effective date.)

"P" Orders

Order Number	Material Covered	Related Form	How Extended
P-1	Material for production of electric traveling cranes (3-12) ... *Revoked by P-5.*		
P-2 to P-2-s	Material for production of machine tools (3-28) ... *Revoked by P-11.*	PD-6	
P-3	Material for production of airframes (4-29)	PD-13	G
P-4	Material for production of airplane engines and propellers (4-29)	PD-14	G
P-5	Material entering into production of cranes and hydraulic bridge brakes (5-26) *Revokes P-1*		F
P-5-a	Material for production of cranes and hoisting equipment (8-1) *Supersedes P-5*		
P-5-b	Material for production of cranes and hoisting equipment (11-1) *Supersedes P-5-a*		
P-6	Defense supplies rating plan (5-31)	PD-25, PD-25-a, PD-25-b, PD-25-c, PD-25-d	F
P-6-a	Civil aircraft, repair parts and accessories (7-21)		
P-7	Material and equipment entering into production of merchant ship construction (6-12)	PD-30, PD-30-a	D
P-8	Material for freight car construction (6-18)	PD-38, PD-38-a	D
P-9-a	Materials entering into the production of airframes for heavy bombers (6-26)	PD-43, PD-43-a	G
P-9-b	Aircraft engines for heavy bombers (6-26)	PD-44, PD-44-a	G
P-9-c	Aircraft propellers for heavy bombers (6-26)	PD-45, PD-45-a	G
P-9-d	Gun turrets for heavy bombers (6-30)	PD-46, PD-46-a	G
P-9-e	Gun sights, bomb sights, gunfire controls for heavy bombers (6-30)	PD-47, PD-47-a	G
P-9-f	Turbo superchargers for heavy bombers (6-30)	PD-48, PD-48-a	G
P-10	Material and equipment entering into conversion of ships (6-19)	PD-41, PD-41-a	
P-11	Material for production of metal working equipment (7-1) *Superseded by P-11-a*	PD-42, PD-42-a	H
P-11-a	Material for production of metal working equipment (9-30) *Revokes P-11*	PD-81, PD-115	F
P-12	Aluminum scrap (6-26)	PD-40	E
P-13	Material for production of airframes (7-3)	PD-52, PD-52-a	G
P-14-a	Material and equipment for construction of shipways in 1941 (7-12)	PD-56, PD-56-a	D
P-14-b	Material and equipment for construction of shipways in 1942 and 1943 (7-12)	PD-56, PD-56-a	D
P-15	Material for electrical relays and solenoid assemblies (7-11)	PD-57, PD-57-a	G
P-16	Material for commercial radio equipment (7-11)	PD-58, PD-58-a	G
P-17	Material for production of canning machinery. *Expired Aug. 31, 1941*		F
P-18	Material entering into production of cutting tool equipment (7-31) *Revoked by P-18-a*	PD-6-Rev.	
P-18-a	Material for production of cutting tools (8-28) *Supersedes P-18.*	PD-81	F
P-19	Material for construction of defense projects (7-18)	PD-63, PD-63-a	F
P-19-a	Material for construction of defense projects (limited to the priorities critical list) (7-18)	PD-68, PD-68-a	F
P-19-b	Material for construction of certain defense projects (7-30)	PD-68, PD-68-a	F
P-19-c	Material for specified publicly financed defense houses		
P-19-d	Material for privately financed housing projects (9-9)		
P-19-e	Material for highway projects		F
P-20	Material for construction of specified locomotives (7-21)	PD-64, PD-64-a	F
P-21	Material for repair and rebuilding locomotives	PD-65, PD-65-a	F
P-22	Repairs (9-9) ... Amend (10-16).		K
P-23	Materials for mining machinery (7-29)	PD-117	
P-24	Material for experimental research work (8-5)	PD-74, PD-74-a	M
P-25	Material for light tanks		F
P-25-a	Parts, accessories and equipment for light tanks (8-11)		F
P-25-b	Light tanks, spare parts and hulls (8-11)		F
P-25-c	30 caliber and 37 mm. guns for light tanks (8-11)		F
P-25-d	Gasoline and diesel engines for light tanks (8-11)		F
P-25-e	Light tank parts (10-14)		F
P-26	Material for medium tanks		F
P-26-a	Parts, equipment for medium tanks (8-11)		F
P-26-b	Medium tanks, spare parts, hulls, etc. (8-11)		F
P-26-c	37 mm. and 75 mm. guns for medium tanks (8-11)		F
P-26-d	Gasoline and diesel engines for medium tanks (8-11)		F

Order Number	Material Covered	Related Form	How Extended
P-26-e.	Medium tank parts (10-14)		F
P-29....	Health supplies rating plan (8-25)	PD-79 / PD-80	F
P-31....	Materials for production of foundry equipment and repair parts (9-5)	PD-81	F
P-32....	Parts for maintenance and repair of farm machinery (8-20)	PD-6 / PD-88	F
P-33....	Farm machinery and equipment (8-20)	PD-81	F
P-38....	Material for production of radiosondes (8-26)	PD-89 / PD-81	
P-39....	Material for production of arc and resistance welding machines (9-12)	PD-81	F
P-40....	Material for industrial lift trucks (10-14)		F
P-41....	Construction, maintenance, operation of defense projects (8-27)		
P-42 / P-42-a	Canning machinery and equipment (8-21 and 9-12)	PD-6	F
P-43....	Research laboratory supplies (8-28)	PD-93 / PD-88 / PD-107	F
P-45....	Material for fire-fighting apparatus (10-31)	PD-81	Q
P-46....	Repairs, maintenance for utilities (9-17)	PD-118	
P-47....	Maintenance, repairs of air transport facilities (9-6)	PD-96	F
P-51....	Canning machinery, equipment (9-22)		
P-52....	Aircraft accessories (9-15)	PD-81 / PD-108	F
P-53....	Textile machinery repairs (9-13)	PD-81	F
P-54....	Specified types of trucks, passenger carriers, trailers (9-12)		J
P-55....	Defense housing projects (9-12)	PD-105 / PD-105-a / PD-105-b	
P-56....	Repairs for mines. Revokes P-22 as provisions apply to mines	PD-119	L
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P-58....	Supplies for specified South American mines (10-8)		M
P-61 ..	Scrap for certain copper ingot makers, remelters (10-13)		
P-62....	Material for laboratory equipment and reagent chemicals (11-15)	PD-93	F
P-68....	Maintenance and repair supplies for steel industry (10-31)	PD-148	P
P-72....	Material for elevator and escalator repair parts (11-10)	PD-81	O
P-75....	Material for tackle blocks (10-24)		
P-76....	Sheet steel for drums..	PD-81 / PD-156	R
P-77....	Material for rebuilding of machine tools (11-10).	PD-81 / PD-157	F
P-78....	Material for conveying equipment (11-10)	PD-81 / PD-82	N
P-79....	Hardware for cooperage and wooden container industry	PD-81	F

"E" Orders

Order Number	Material Covered	Related Form	How Extended
E-1	Machine tools (3-28). Supplement No. 1 (7-7). *Revokes E-1.*		
E-2	Cutting tools (7-17). Amendment (7-25).		
E-2-a	Supplement (8-28). *Revokes E-2.*		

"L" Orders

Order Number	Material Covered	Related Form	How Extended
L-1	Restricts production of motor truck and public passenger carriers (8-30). Amended by L-1-a.	PD-95	
L-1-a	Restricts production of medium motor trucks, truck trailers, passenger carriers and replacement parts (9-12). *Amends L-1*		
L-2	Restricts production of passenger automobiles (9-13).		
L-2-a	Supplement (10-24).		
L-2-b ..	Restricts use of bright work on automobiles after Dec. 15 (10-27).		
L-2-c ..	Automobile output schedule for January, 1942 (11-7).		
L-3	Restricts production of light motor trucks (9-13).		
L-3-a ..	Supplement (10-24).		
L-3-b ..	Supplement (11-4).		
L-4	Restricts production of replacement parts used in repair of passenger automobiles and light trucks (9-19).		
L-4-a ..	January, 1942, production schedule for light trucks for civilian use (11-14).		
L-5	Restricts domestic mechanical refrigerator production (9-30).	PD-125	
L-6	Restricts production of ironers and washers (10-29).		
L-7	Restricts production of non-mechanical ice refrigerators (10-29).		
L-8	Restricts distribution of motor fuel in Atlantic Coast area. *Revoked Oct. 24.*		
L-11	Restricts use of chlorine in pulp, paper and paperboard making (11-15).		
L-13	Restricts production of metal office furniture, etc. (11-7).		
L-15	Restricts use of waste paper in Eastern mills (10-25).		
L-16	Restricts electric power use in Southeastern area (10-30).		
L-20	Restricts use of cellophane and similar materials derived from cellulose (11-8).		

"S" Orders

Order Number	Material Covered	Related Form	How Extended
S-1	Suspends certain operations of pattern and aluminum foundry in Chicago (10-16).		

Miscellaneous Orders

Priorities Regulation No. 1 (8-27).
Priorities Regulation No. 2 (9-9).
General Metals Order No. 1. [*Terminated September 23, 1941. Restrictions imposed covered by Priorities Regulation No. 1*].
Special Allocation No. 1—Directs certain machine tool builders to accept specified orders for Russia (11-11).

"M" Orders

Order Number	Material Covered	Related Form	How Extended
M-1.....	Aluminum (3-22)	PD-8 / PD-23 / PD-26 / PD-39 / PD-40	
M-1-a....	Supplement—schedule of ratings (3-22).		

Order Number	Material Covered	Related Form No.
M-1-b	Supplement modifies M-1 and M-1-a with respect to low-grade deliveries (4-11). Extension—extends M-1, M-1-a, M-1-b to Dec. 31, 1941 (5-20). *Superseded by M-1-c.*	
M-1-c	Supplement — directs distribution of scrap and secondary aluminum (6-10).	PD-114
M-2	Magnesium (3-24).	PD-26-m, PD-40-m
M-2-a	Supplement (3-24). Extension—extends M-2 to Sept. 30, 1941 (4-2).	
M-2-b	Supplement — extends control over scrap, dead stock, etc. (11-14).	
M-3	Tungsten (3-26)	PD-9
M-3-a	Supplement (3-26). *M-3 and M-3-a revoked by M-29.*	
M-4	Neoprene (3-28). *M-4 expired June 30; included under provisions of M-13.*	PD-7, PD-36
M-5	Nickel-bearing steel (4-10).	PD-10, PD-11, PD-17, PD-18
M-5-a	Supplement (4-10). Amendments (4-30).	
M-5-b	Supplementary order (6-17). *M-5, M-5-a, M-5-b, revoked by M-21-a.*	
M-6	Nickel (5-15)	PD-27
M-6-a	Primary nickel (9-30). *Supersedes M-6.*	
M-7	Borax and boric acid (6-9). *M-7 expired August 30, 1941.*	PD-31
M-8	Cork (5-31)	PD-28, PD-51
M-8-a	Cork end products (10-1)	PD-29
M-9	Copper (5-29). Amendment (6-10). Amendment (7-9).	PD-37, PD-76
M-9-a	Supersedes M-9 (8-2).	PD-120, PD-121, PD-126, PD-130, PD-109
M-9-b	Copper scrap and copper base alloy scrap (10-1)	
M-9-c	Curtails use of copper in certain items (10-21). Amended (11-1).	PD-167
M-10	Polyvinyl chloride (6-9)	PD-7, PD-36
M-11	Zinc (7-1)	PD-50, PD-50-a, PD-62, PD-94
M-11-a	July pool (7-1)	
M-11-b	August pool (8-1).	
M-11-c	September pool (9-1).	
M-11-d	October pool (10-1).	
M-11-e	November pool (11-1).	
M-13	Synthetic rubber (includes Neoprene) (6-9)	PD-7, PD-33, PD-36
M-14	Tungsten high-speed steel (6-11).	PD-101
M-15	Rubber (6-20)	PD-49
M-15-a	Supplement (6-27).	
M-16	Tricresyl and triphenyl phosphates (8-30).	
M-17	Pig iron (8-1). Amendment (10-14).	PD-69, PD-70, PD-71
M-18	Chromium (9-7). Amendment (8-22).	PD-53-a, PD-53-b, PD-54, PD-55
M-19	Chlorine (7-26).	
M-20	Calcium-silicon (7-29)	PD-72
M-21	Steel (8-9). Amendment (9-9).	PD-73, PD-75, PD-99, PD-100
M-21-a	Supplement — relating to alloy iron, alloy steel and wrought iron (9-16).	
M-21-b	Supplement — relating to steel warehouses (9-3). Directive-assigns A-9 Rating to warehouse supplies (9-26). *M-5, M-5-a, M-5-b, revoked by M-21-a.*	PD-83-a, PD-83, PD-83-b, PD-83-d
M-23	Vanadium (8-14)	PD-84
M-24	Scrap iron and steel (10-11).	PD-149, PD-150, PD-151
M-25	Formaldehyde, paraformaldehyde, hexamethylenetetramine and synthetic resins (8-23). Amendment (8-28).	
M-27	Phenols (8-30).	
M-28	Chlorinated hydrocarbon refrigerants (8-22).	
M-29	Tungsten (8-31)	PD-9
M-29-a	Supplement (10-13).	
M 30	Ethyl alcohol (8-28).	
M-31	Methyl alcohol (8-28).	
M-32	Potassium perchlorate (8-28).	
M-33	Potassium permanganate (8-28).	
M-34	Toluene (8-28).	
M-35	Phosphorus oxychloride (8-30).	
M-36	Manila fiber and manila cordage (8-29).	
M-38	Lead (10-4)	PD-66-a, PD-124
M-38-a	Supplement (11-17).	
M-39	Cobalt (11-4).	PD-152, PD-153
M-41	Chlorinated solvents, including carbon tetrachloride, trichlorethylene, perchlorethylene and ethylene dichloride.	PD-127
M-45	Sheet steel inventory for drums	
M-46	Chlorinated rubber (10-29)	

OPA Price Ceilings Affecting the Metal Working Industry

(Numbers in brackets refer to date of issuance)

Price Schedule	Subject
No. 1	Second-hand machine tools (2-17) Amendment (3-15) — (4-9) — (9-24) Supplement 1 (5-7)
No. 2	Aluminum scrap and secondary ingot (3-24)
No. 3	Zinc scrap (3-31) Statement of policy (4-9) Amendment (10-17)
No. 4	Iron and steel scrap (4-3) Amendment (4-9)—(5-7)—(6-18) — (6-20) — (6-21) — (8-7) — (8-26)—(9-5)—(9-22)—(9-26)
*No. 5	Bituminous coal (4-2)
No. 6	Iron and steel products (4-16) Revised (6-20)
No. 8	Nickel scrap (5-29) Amendment (6-26) — (9-5) — (9-18)
No. 10	Pig iron (6-24)
No. 12	Brass mill scrap (7-21) Amendment (10-1)
No. 15	Copper (8-12) Amendment (8-28)
No. 17	Pig tin (8-14)
No. 18	Burlap (8-15)
No. 19	Southern pine lumber (8-16)
No. 20	Copper scrap (8-18) Amendment (10-10)
No. 21	Formaldehyde (8-20)
No. 22	Pennsylvania crude oil (8-22)
No. 26	Douglas fir lumber (9-11)
*No. 27	Anthracite coal (9-11)
No. 28	Ethyl alcohol (9-15)
No. 29	Coke (9-18)
No. 30	Waste paper (9-18)
No. 31	Acetic acid (9-24)
No. 32	Paperboard (9-30)
No. 34	Wood alcohol (10-3)
No. 36	Acetone (10-20)
No. 37	Normal butyl alcohol (10-20)
No. 38	Glycerine (10-27)
No. 40	Builders' hardware and insect cloth (11-14)
No. 41	Steel castings (11-14)

* Price schedule No. 5 revoked 5-1; No. 27 revoked 9-10.

Forms to Use With Priority Orders

Forms below are those in active use at time of going to press. Some forms, previously in use, but now obsolete, are not listed. See column "Related Forms," pages 3, 4 and 5.

Form No.	Description
*PD-1	Application for preference rating.
*PD-2	Civilian preference rating certificate.
PD-3	Army or Navy preference rating certificate.
PD-4	U. S. Government agency preference rating certificate, other than Army and Navy.
PD-5	Foreign government preference rating certificate.
*PD-6 Rev.	Tabulation of extension for preference ratings made pursuant to preference orders P-5-a, P-18 and P-32.
*PD-6-a	Alternate of Form PD-6.
PD-7	Monthly synthetic rubber requirements.
PD-8	Priority rating index of products requiring aluminum.
PD-9	Application for allocation of ferrotungsten, tungsten powder or tungsten compounds.
*PD-13	Tabulation of preference rated orders placed during a given month, pursuant to Order P-3.
*PD-14	Tabulation of preference rated orders placed during a given month, pursuant to Order P-4.
PD-20	Application for preference rating for copper or zinc from Metals Reserve Co. pool.
PD-23	Report to be filed by all customers requesting delivery of aluminum after a given date (withheld).
PD-24	Priorities Critical List.
PD-25	Report of requirements for scarce materials (first report).
PD-25-a	Report of requirements for scarce materials.
*PD-25-b	Report of extension of Defense Supply Rating Order (P-6).
*PD-25-c	Customer's certificate identifying order under Defense Supplies Rating Plan (P-6). Sent to supplier monthly.
*PD-25-d	Customer's certificate identifying order under Defense Supplies Rating Plan (P-6). Sent to supplier with each order.
PD-26-a	Aluminum monthly shipping schedule.
PD-26-m	Monthly magnesium shipping schedule.
PD-27	Detailed application for nickel required for melting in a given month, and statement of stocks and consumption.
PD-28	Affidavit of compliance with cork order.
PD-29 Rev.	Report of cork shipments and processing requirements pursuant to Order M-8.
*PD-30	Tabulation of preference rated orders placed for a given month, pursuant to Order P-7.
*PD-30-a	Alternate form to PD-30.
PD-33	Report of producer's stock, and production and orders, re: Order M-13.
PD-36	Consumption, allotment and receipts of synthetic rubber materials and plasticized resins, pursuant to Order M-13.
PD-37	Reports of production of duty-free refined copper.
*PD-38	Tabulation of preference rated orders placed during a given month, pursuant to Order P-8.
*PD-38-a	Alternate form to PD-38.
PD-39	Statement substantiating evidence of monthly aluminum delivery schedule given in PD-26.
PD-40-a	Report on inventory and consumption of aluminum.
PD-40-m	Report on magnesium inventory.
*PD-42	Tabulation of extensions of preference ratings made pursuant to Order P-11.
*PD-42-a	Certification of Form PD-42.
*PD-43	Tabulation of extensions of preference rated orders placed pursuant to Order P-9-a.
*PD-43-a	Certification of PD-43.
*PD-44	Tabulation of extensions of preference rated orders placed pursuant to Order P-9-b.
*PD-44-a	Certification of Form PD-44.
*PD-45	Report of preference rated orders placed pursuant to Order P-9-c.
*PD-45-a	Certification of Form PD-45.
*PD-46	Report of preference rated orders placed pursuant to Order P-9-d.
*PD-46-a	Certification of Form PD-46.
*PD-47	Report of preference rated orders placed pursuant to Order P-9-e.
*PD-47-a	Certification of Form PD-47.
*PD-48	Report of preference rated orders placed pursuant to Order P-9-f.
*PD-48-a	Certification of Form PD-48.
PD-49 Rev.	Report of crude rubber stocks and consumption, pursuant to Order M-15. Filed by processor.
PD-49-a Rev.	Report of crude rubber stocks, receipts and consumption, re: M-15. Filed by importers and dealers.
PD-50	Customer's affidavit concerning zinc.
PD-50-a	Producer's affidavit of compliance with preference order on zinc.
*PD-52	Report of preference rated orders placed pursuant to Order P-13.
*PD-52-a	Certification of Form PD-52.
PD-53-a	Application for chromium needed for melting.
PD-53-b	Report on chromium stocks, shipments and consumption.
PD-54-Rev.	Request for chromium chemicals.
PD-55	Request for chromite refractories.
*PD-56	Report of preference rated orders placed pursuant to Order P-14-a.
*PD-56-a	Certification of Form PD-56.
*PD-57	Report of preference rated orders placed pursuant to Order P-15.
*PD-57-a	Certification of Form PD-57.
*PD-58	Report of preference rated orders placed pursuant to Order P-16.
*PD-58-a	Certification of Form PD-58.
PD-59	Application for copper for domestic use.
PD-59-a	Application for copper for domestic use.
PD-60	Analysis of copper for domestic use.
PD-60-a	Analysis of copper for domestic use.
PD-61	Output and shipments of copper.
*PD-62	Application for allocation of zinc oxide.
*PD-63	Report of contracts or orders to which rating assigned by Order P-19 has been applied during a month.
*PD-63-a	Certification to accompany purchase orders furnished by the builder or supplier in connection with P-19.
*PD-64	Reports of contracts or orders to which rating assigned by Order P-20 has been applied during a month.
*PD-64-a	Certification to accompany purchase orders furnished by the builder in connection with P-20.

Form No.	Description
*PD-65	....Report of contracts or orders to which rating assigned by Order P-21 has been applied during a month.
*PD-65-a	...Certification to accompany purchase order furnished by the repairer or builder in connection with P-21.
PD-66-a	...Application for allocation of lead, re: M-38.
*PD-68	....Report of contracts or orders to which rating assigned by Order P-19-a has been applied during a month.
*PD-68-a	...Certification to accompany purchase orders furnished by the builder or supplier in connection with P-19-a.
*PD-69	....Customer's pig iron order for shipment.
PD-70	....Customer's report of inventory and consumption of pig iron.
PD-71	....Pig iron producer's shipping schedule.
PD-71-a	...Authorization establishing pig iron emergency pool.
PD-71-b	...OPM authorization to pig iron producer to make shipments.
PD-71-c	...OPM allocation order to pig iron producer.
PD-72	....Requirements of calcium silicon.
*PD-73	....Customer's statement to producer classifying purchase order or contract for steel.
*PD-74	....Report of orders to which rating assigned by Order P-24 has been applied.
*PD-74-a	...Certification to accompany PD-74.
*PD-75	....Request for alloy iron or steel.
PD-76	....Copper allocation.
PD-79	....Requirements of scarce materials in connection with Health Supplies Rating Plan (P-29).
PD-80	....Report of re-extension of Health Supplies Rating Order.
*PD-81	....Monthly report of rating assignments in connection with various P orders.
PD-81-a	...Certification of Form PD-81.
PD-82	....Application for limited preference rating order for materials for defense production.
PD-83	....Statement of deliveries of steel warehouses.
PD-83-b	...Steel preference rating certificate.
PD-83-c	...Producers statement regarding consigned steel sales and stocks.
PD-83-d	...Classification instructions for steel warehouse report PD-83-a.
PD-84	....Monthly report of vanadium inventories and consumption.
PD-88	....Application for preference rating, re: P-43.
*PD-93	....Report of preference rated orders placed pursuant to P-43 and P-62.
PD-94	....Monthly application for zinc allocations.
PD-95	....Application for preference rating in connection with Order L-1.
PD-96	....Application for preference rating for scarce materials needed for maintenance and repair of aircraft, in connection with Order P-47.
PD-97	....Report of aluminum foil inventory and use in manufacture of fixed condensers.
PD-98	....Monthly inventory and consumption report concerning aluminum foil.
PD-99	....Steel capacity and rolling schedules for November; a producer's report.
PD-100	...Same as PD-99 except that it is for use by producers with more than one plant.

Form No.	Description
PD-101	...Quarterly report of high-speed steel orders and shipments, pursuant to Order M-14.
PD-105 PD-105-a PD-105-b	Application for preference rating in connection with privately financed defense housing projects, and documentation sheets pursuant to order P-55.
PD-107	...Questionnaire for applicants for supplies and equipment in connection with Order P-43.
PD-108	...Application for preference rating in connection with Order P-52.
PD-109	...Report of foundry receipts, purchase and consumption of copper and copper alloy scrap between Sept. 30 and Nov. 1, pursuant to Order M-9-b.
PD-114	...Application for authorization to enter into toll processing agreement for aluminum and magnesium.
PD-115	...Application for preference rating, re: P-11.
PD-117	...Report concerning mining machinery, P-23.
PD-118	...Report of withdrawals, re: P-46.
*PD-119	..Monthly report of purchases, supplies, maintenance items and repairs under Order P-56.
PD-120	...Dealers' report on scrap metals.
PD-121	...Monthly report of copper scrap consumer.
PD-123	...Monthly requirements of copper and copper alloys.
*PD-124	...Monthly delivery schedule of lead supplies, re: M-38.
PD-125	...Monthly report of mechanical refrigerator makers, re: L-5.
PD-126	...Dealers' application for listing as melters under copper scrap order.
*PD-127	...Purchasers' certificate, re: M-41.
PD-130	...Application by melters or processors for preference rating under copper scrap order.
*PD-131	...Report of adjustments under L-8.
PD-133	...Certificate of compliance with M-8.
PD-143	...Report of chlorinated rubber needs of fabricators.
PD-144	...Report of chlorinated rubber receipts, use and inventory, filed by fabricator.
*PD-148	...Application for preference rating for iron and steel plant reports, re: P-68.
*PD-149	...Monthly report of iron and steel scrap producer.
*PD-150	...Monthly report of iron and steel scrap consumer.
*PD-151	...Monthly report of iron and steel scrap broker or dealer.
PD-152	...Report on cobalt, re: M-39.
PD-153	...Report on cobalt, re: M-39.
PD-156	...Application for rating for steel for drums, re: P-76.
PD-157	...Report of rebuilt machine tools, re: P-77.
PD-158-b	..Distributors' reports on chlorine sales.
PD-158-c	..Users' report on chlorine consumption.
PD-159-a	..Report on chlorine production.
PD-165	...Request for name of supplier served a specified priority certificate.
PD-167	...Hardship appeal under copper conservation order M-9-c.

*These forms may be reproduced, but no changes of any nature from the original text are permitted.

How to Extend Priority Orders to Suppliers

(Letters under column HOW EXTENDED in list of P Orders (page 3) refer to methods below)

Method A

Applies to PD-1 and PD-2

In effect, OPM at present has eliminated the PD-2 and is returning to the applicant the original PD-1 application form stamped with Mr. Nelson's facsimile signature. When thus returned, PD-1 to all intents and purposes becomes the same as PD-2 which used to be issued. Applicant then sends the approved and stamped PD-1 to his supplier. If the sub-contractor or supplier wishes to extend this certificate to his sub-contractor or supplier, the same procedure applies as existed when the PD-2 was used; that is, he reapplies on another PD-1 application form.

Method B

Applies to PD-3 and PD-4

Blank copies of these certificates should be obtained from the branch of the service or government originating the certificate, which should then be filled in and certified on the back in the space provided in the left hand side. This signed set should then be taken or sent to the nearest branch of the service or government originating the certificate for certification by the procurement officer, inspector or authenticating officer. When taking or sending such certificate for authentication, the original certificate received should be taken or sent also in order that the procurement officer may identify to his satisfaction the extension which he is being asked to authenticate.

Method C

Applies to PD-5

PD-5 is extended in the same way as PD-3 and PD-4 except that there is required on the back an additional counter-signature of the government official representing the various governments from which the original PD-5 was issued.

Method D

On one of the blank copies, execute the acknowledgment ("the undersigned acknowledges receipt of . . .") and send this to the Priorities Division, OPM, Washington. Do not execute the certification. On another blank copy, execute the certification (leaving the acknowledgment blank) and forward this together with your order to the sub-contractor or supplier. Such executed copy is the extension.

Method E

Execute and have notarized the acknowledgment and forward one copy to the Priorities Division, OPM, Washington. On another copy execute the acknowledgment and forward with the order to sub-contractor or supplier.

*P-12 can be extended only to the person from whom the smelter purchases the scrap. Follow instructions for Method E except that it is applicable only to the supplier. The acceptance must be notarized.

Method F

Execute the acknowledgment and forward one copy to the Priorities Division, OPM, Washington. On another copy execute the ackrowledgment and forward with the order to sub-contractor or supplier. (Same as Method E except that no notarization is needed.)

Method G

Execute the acknowledgment and forward one copy to the Priorities Division, OPM, Washington. Execute the certification on another copy and have the certification also authenticated by the officer or inspector located at the plant of the issuing "producer."

Method H

Execute the acceptance and send to the Priorities Division, OPM, Washington. Execute the affidavit, filling in lines 15 and 16 with the name of the customer who sent the order to you.

Method I

Insert in the space provided, classification of the "producer." Execute in the spaces provided and send one copy to the Power Branch, OPM, Washington. Do the same with another copy except that this copy should be retained for file. In order to extend this rating from "producer" to supplier or from supplier to sub-supplier, such "producer" or supplier must endorse the following statement on the original and all copies of each purchase order or contract for materials, the delivery of which is entitled to the preference rating: "Purchase order for Utilities Operation, Maintenance and Repair, Preference Rating A-10, pursuant to Preference Rating Order No. P-46" (Authorized Signature) and deliver the original or copy to the seller of such material.

Method J

Order for material is endorsed by producer and supplier as follows: "An (A-3; A-10) preference rating is assigned to this purchase order pursuant to Limited Preference Rating Order No. (P-54; P-57). This application of rating is made by the (supplier; producer) upon the conditions set forth on said order, with which we are familiar.

—(Authorized signature of producer or supplier)."

Note: P-54 assigns A-3 rating; P-57 assigns A-10 rating.

Method K

A producer or supplier in order to apply the preference rating to deliveries of material to him, must endorse the following statement on the original and all copies of the purchase order or contract for such material manually signed by a responsible official duly designated for such purpose by the producer or supplier: "Material for maintenance, repair or operating supplies—Rating A-10 under Preference Rating Order P-22, as amended, with the terms of which I am familiar. (Authorized signature)."

Method L

In order to apply the A-1 rating, send a statement to the OPM at Washington describing the material and the nature of the emergency. OPM will certify the application, which is to be passed on to the supplier.

To extend the A-8 priority endorse as follows: "Purchase order for material for a mine rating pursuant to Preference Rating Order P-56 Mine Serial No. . . . . Rating A-8. This application is made pursuant to the terms and conditions of that order with which the undersigned is familiar. —Authorized Signature."

Method M

The preference rating may be assigned by the operator and the supplier, by endorsing the following statement, with the applicable preference rating stated, on the original purchase order or contract and all copies thereof: "An A- (fill in applicable rating) preference order is assigned to this purchase order pursuant to Limited Preference Rating Order P-58. This application of the rating is made by the (Operator; Supplier) upon the conditions set forth in said order with which the undersigned is familiar. (Authorized signature of operator; supplier.)"

Method N

Execute the acceptance at the end of the order; detach and send to Industrial & Office Machinery Branch, Division of Civilian Supply, OPM, Washington; furnish one copy of the order with an unsigned form of acceptance to the supplier. Producer or supplier shall identify all purchase orders which are covered with the rating by endorsing the following statement thereon: "Material for defense products—Preference Rating (fill in) Under preference rating order P-78, Serial No. (fill in) with the terms of which I am familiar. (Authorized signature.)"

Method O

Same as Method N except that statement endorsed on purchase orders reads: "Purchase order for material for elevator and escalator repair parts, preference rating A-3, pursuant to Preference rating order No. P-72."

Method P

After approval of application by OPM, copy of the notification is furnished by producer to supplier. Producer or supplier endorses following statement on original and all copies of purchase order: "Material for repair, maintenance or operating supplies of an Iron, Steel, Blast Furnace, Coke, or Ferroalloys plant, Rating A- (fill in); under Preference Rating Order P-68; Serial No. (fill in) and in compliance therewith. (Authorized signature.)"

Method Q

Execute acceptance, detach and send to Fire Equipment Section, Division of Purchases, OPM. Furnish one copy of the order, with unsigned acceptance, to each supplier. Producer or supplier endorses following statement on material orders: "Preference Rating A-2. Purchase order for material to be physically incorporated into Fire Apparatus as defined in Preference Rating Order No. P-45, Serial No. (fill in) with which I am familiar. (Authorized signature.)"

Method R

Execute acceptance, detach and send to OPM at Washington. Furnish copy of the order to supplier. Endorse following statement on all copies of each purchase for material: "Purchase order for container steel, preference rating A-4, pursuant to Preference Rating Order P-76, not extendable."

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IMPORTANT: Each Preference Rating Order contains full instructions for applying the rating to delivery of material, and the order should be consulted whenever questions arise.

Ratings Given Defense Items

(Preference Ratings as of Nov. 22, 1941, Assigned by Various OPM Orders)

Important: Ratings are granted by the Army and Navy for material it requires on the Priorities Critical List, while the Priorities Division of the OPM issues ratings for all civilian projects and items, both military and civilian, which are not on the Critical List. The rating granted is governed by the urgency of the need for the item. Thus, material for guns for light tanks is granted a rating of A-1-f, while material for freight cars is rated A-3, indicating guns are more urgently needed than freight cars. The sequence of ratings is A-1, A-1-a, A-1-b, etc., A-2, A-2-a, A-2-b, etc., A-3, A-3-a, etc. Important civilian projects are usually assigned B ratings.

Description	Preference Order No.	Rating Assigned
Aircraft		
Material for airframes	P-3	A-1-d
Material for engines and propellers	P-4	A-1-c
Civil, repair parts and accessories	P-6-a	A-10
Material for heavy bomber airframes	P-9-a	A-1-b
Engines for heavy bombers	P-9-b	A-1-b
Propellers for heavy bombers	P-9-c	A-1-b
Gun turrets for heavy bombers	P-9-d	A-1-b
Gun sights, bombsights and gunfire controls for heavy bombers	P-9-e	A-1-b
Material for airframes	P-13	A-1-b
Transportation facilities, material for maintenance and repairs	P-47	A-3
Aluminum scrap	P-12	A-10
Automobiles, passenger, and light trucks, material for replacement parts	P-57	A-10
Canning machinery and equipment, material for production	P-42 P-42A P-51	A-3 A-7 A-3
Conveyor machinery	P-78	A-3
Copper		
South American mines, material for maintenance and operation	P-58	A-3
Scrap and copper base alloys	P-61	A-10
Cranes and hoisting equipment, material for production	P-5-b	A-10 or higher
Cutting tools, material for production	P-18-a	A-1-a
Defense projects		
Material for construction	P-19	As assigned
Material limited to the Priorities Critical List	P-19-a	As assigned
Projects with protected delivery dates	P-19-b	As assigned
Material for construction, maintenance and operation	P-41	A-1-a
Defense supplies rating plan	P-6	A-10
Drums, sheet steel for construction of	P-76	A-4
Electrical relays and solenoid assemblies, material	P-15	A-1-d
Elevator and escalator repair parts	P-72	A-3
Farm Machinery and Equipment		
Maintenance and repairs	P-32	A-1-b
Material for construction	P-33	B-1
Fire apparatus, material for production	P-45	A-2
Foundry equipment and repair parts	P-31	A-1-b
Freight cars construction, material	P-8	A-3
Health supplies rating plan	P-29	A-10
Housing, defense, construction material		
Privately financed	P-19-d	as assigned
Publicly financed	P-19-c	as assigned
Material	P-55	as assigned
Iron and steel plants, maintenance, repair and supplies	P-68	A-3
Laboratory equipment and reagent chemicals, material for production	P-62	A-5
Lift trucks, industrial, material for production	P-40	A-1-g
Locomotives		
Steam, electric or diesel, material for repair and rebuilding	P-21	A-3
Specified, material for construction	P-20	A-3
Machine tools, material for rebuilding	P-77	A-1-c
Metal working equipment, material for production	P-11-a	as assigned
Mines		
Machinery and equipment	P-23	A-3
Maintenance, repairs and supplies	P-56	A-1-a A-8
Radio receiving, transmitting and directional equipment	P-16	A-1-c
Radiosondes, material for production	P-38	A-1-d
Repairs, maintenance and supplies	P-22	A-10
Research		
Experimental work, material for production	P-24	A-1-b
Laboratories, supplies and equipment	P-43	A-2
Road projects, material for construction	P-19-e	As assigned
Ships		
Merchant, material for construction	P-7	A-1-a (1941) A-1-b (1942) A-1-c (1943)
Conversion, material	P-10	AA
Ways, construction and equipment	P-14-a P-14-b	A-1-a 1941 A-1-b 1942 1943
Tackle blocks, material for production	P-75	A-1-c
Tanks, light type		
Parts, accessories and equipment	P-25-a	A-1-f
Spare parts and accessories	P-25-b	A-1-f
30 cal. and 37 mm. guns	P-25-c	A-1-f
Gasoline and diesel engines	P-25-d	A-1-f
Material for production	P-25-e	A-1-f
Tanks, medium type		
Parts, accessories and equipment	P-26-a	A-1-d
Spare parts and accessories	P-26-b	A-1-d
37 mm. and 75 mm. guns	P-26-c	A-1-d
Gasoline and diesel engines	P-26-d	A-1-d
Material for production	P-26-e	A-1-d
Textile machinery and equipment, parts for maintenance and repair	P-53	A-10
Trucks, truck trailers, and passenger carriers, material for production	P-54	A-3
Utilities, maintenance, repair and supplies	P-46	A-10
Welding machines, arc and resistance, material for production	P-39	A-1-c
Wooden container and cooperage industry, hardware items	P-79	A-5 A-8

Deadlines on Principal Monthly Reports to OPM on Metals

●● Listed below are principal reports being required by OPM from various metal fields on regular schedules. One-time and occasional reports have not been included. Some companies using numerous types of metals are required to file reports from a majority of the groups listed below. For example, a steel company in the East in addition to the reports listed under "Steel" below, files monthly consumer reports on aluminum, calcium-silicon, chromium, cobalt, copper, lead, nickel, pig iron, tungsten and vanadium. As suppliers, metal producers may file some of the reports listed in Section II below, when extension was necessary. A machine tool producer may file consumer reports on pig iron, aluminum and other metals in addition to such forms as PD-1, PD-81, PD-73, PD-25-c and E-2-a. Monthly reports of one Middle West machine tool producer weighed 27 lbs. when sent in last month.

Most orders specify that all persons affected by the order shall keep and preserve for a period of not less than two years (and in some cases five years) accurate and complete records of inventories, details of all transactions, contracts, purchases, etc.; names of all parties involved in transactions; accurate record of preference ratings; and all other pertinent information. Most scrap metals must be reported upon. PD-149 is the new monthly report due by the 20th from producers of over 50 tons of iron or steel scrap per month and PD-150 is the consumers' report. Brokers and dealers must file PD-151.

SECTION I

METAL	FORM NO.	WHO FILES IT	WHEN IT IS FILED	NEXT REPORT	SUBJECT OF REPORT	WHERE IT IS SENT
ALUMINUM	PD-40-a	Purchaser	Quarterly—next report to cover Dec. 30	Jan. 5	Inventory at end of preceding month and consumption analysis (notaried)	Aluminum and Magnesium Branch, OPM Priorities Division, Washington
	PD-26-a	Producers, Fabricators and Secondary Smelters	Monthly—due on 20th of month preceding month covered by report.	Dec. 20	Quadruplicate form giving contemplated shipping schedule (notaried)	F. B. Cliffe, Aluminum and Magnesium Branch, OPM, Washington
	.....	Producer	Monthly		Report on actual shipments	
CALCIUM-SILICON	PD-72	Purchaser	Monthly—by 25th	Dec. 25	Requirements for succeeding month and report on stocks (notaried)	Priorities Division, OPM, Washington
CHROMIUM	PD-53-a	Purchaser	Monthly—by 25th	Dec. 25	Detailed application covering requirements in next month, showing per cent of above for each customer	Director of Priorities, OPM, Washington, (2 copies)
	PD-53-b	Consumer	Monthly—by 25th	Dec. 25	Report on consumption, stocks, etc., in preceding month (notaried)	Director of Priorities, OPM, Washington (Original and one copy to Washington; copy to supplier)
COBALT	PD-152	Consumer	Monthly—by 20th	Dec. 20	Requirements for month	OPM Priorities, Washington
	PD-153	Consumer	Monthly—by 20th	Dec. 20	Report on stocks, etc.	OPM Priorities, Washington
COPPER	PD-59-a	Fabricator	Monthly—by 20th	Dec. 20	Application in triplicate for next month's supply for domestic consumption	OPM Copper Commodity Branch, Washington
	PD-60-b	Fabricator	Monthly—by 20th	Dec. 20	Triplicate report on requirements for various classifications	OPM Copper Commodity Branch, Washington
	PD-61	Refiner	Monthly		Output and shipments of duty free copper	OPM Copper Commodity Branch, Washington
LEAD	PD-66-a	Consumer	Monthly—by 15th	Dec. 15	Application for allocation in next month, giving inventory, etc.	OPM Lead Commodity Branch, Washington
	PD-124	Producer	Monthly—by 20th	Dec. 20	Schedule of proposed shipments in next month, customer's names, etc.	OPM Lead Commodity Branch, Washington
NICKEL	PD-27	Purchaser	Monthly—by 20th	Dec. 20	Report of requirements in next month, stocks, with customer's names. (Notaried)	OPM Priorities, Washington (Copy of Sched. II to supplier)
MAGNESIUM		Owner of Dead Stock	Monthly—last day of month	Nov. 31	Amount and kind of all dead stock	Aluminum and Magnesium Branch, OPM, Washington
	PD-26-m	Producer, Fabricator, Secondary Smelter	Monthly—by 20th	Dec. 20	Shipping schedule	Aluminum and Magnesium Branch, OPM, Washington
	PD-40-m	Users	Monthly—by 15th	Dec. 15	Inventory	Aluminum and Magnesium Branch, OPM, Washington
PIG IRON	PD-69	Customer	Monthly—by 5th	Dec. 5	Requirements during coming month (Quadruplicate; notaried)	To Producer
	PD-70	Customer	Monthly—by 15th	Dec. 15	Report of inventory and consumption. Notaried	Iron and Steel Branch, OPM, Washington

		ary Smelter				
	PD-40-m	Users	Monthly—by 15th	Dec. 15	Inventory	Aluminum and Magnesium Branch, OPM, Washington
PIG IRON	PD-69	Customer	Monthly—by 5th	Dec. 5	Requirements during coming month (Quadruplicate; notaried)	To Producer
	PD-70	Customer	Monthly—by 15th	Dec. 15	Report of inventory and consumption. Notaried	Iron and Steel Branch OPM, Washington
	PD-71	Producer	Monthly—by 15th	Dec. 15	Shipping schedule for following month. Quadruplicate	Iron and Steel Branch, OPM, Washington
STEEL	PD-83	Warehouse	Monthly—by 15th	Dec. 15	Report of shipments in preceding month, receipts and inventory	Iron and Steel Branch, OPM, Washington
	PD-99	Producer	Monthly—by 6th	Dec. 6	Scheduled production and proposed distribution	Iron and Steel Branch, OPM, Washington
	PD-73	Warehouse	Monthly—by 5th	Dec. 5	Report of all orders placed with producer in previous month	To Producer
	PD-100	Producer	Monthly—by 6th	Dec. 6	Capacity, allocation and rolling schedule	Iron and steel Branch, OPM, Washington
	PD-101	Producer	Quarterly		High speed steel orders and shipments made	Iron and Steel Branch, OPM, Washington
	AIS-16	Producer	Monthly—by 25th	Dec. 25	Report of shipments by consuming industries	Copy to OPM and copy to A.I. & S.I.
	AIS-17	Producer	Monthly—by 15th	Dec. 15	Shipments and unfilled tonnage reports	Copy to OPM and copy to A.I. & S.I.
	AIS-17-a	Producer	Monthly—by 15th	Dec. 15	Shipments and unfilled tonnage reports	Copy to OPM and copy to A.I. & S.I.
TUNGSTEN	PD-9	Purchaser	Monthly—by 10th	Dec. 10	Request for allocation in following month and report on stocks	OPM Priorities, Washington
VANADIUM	PD-84	Purchaser	Monthly—before 25th	Dec. 25	Inventories for current month, and consumption in preceding month, probable consumption in following month	OPM Priorities, Washington
ZINC	PD-50-a	Producer	Monthly—by 10th	Dec. 10	Statement of compliance and list of orders lacking PD-50 during preceding month	Copper-Zinc Branch, OPM, Washington
	PD-94	Customer	Monthly—by 10th	Dec. 10	Application for allocation in following month; report of consumption in preceding month; inventory for current month	Copper-Zinc Branch, OPM, Washington

SECTION II

Monthly reports by producers and suppliers showing tabulation of preference rated orders extended in the previous month are due as follows:

Monthly, by the 15th (Next report due Dec. 15)

Aircraft Maintenance PD-81 (or PD-81-a)
Airframes, heavy bomber PD-43 (or PD-43-a)
Airplane Engines and Props PD-14
Auto and truck parts
Cranes PD-81(PD-81-a)
Cutting Tools PD-6 (or PD-6-a)
Defense Supplies PD-25-c
Engines, heavy bomber PD-44 (PD-44-a)
Farm Machinery Repair PD-81 (PD-81-a)
Freight Cars PD-38 (PD-38-a)
Gun Turrets, bomber PD-46 (PD-46-a)
Gunsights, etc., bomber PD-47 (PD-47-a)
Locomotive Repair PD-64 (PD-64-a)
Locomotive Making PD-65 (PD-65-a)
Machine Tools PD-81 (PD-81-a)
Propellers, bomber PD-45 (PD-45-a)
Radio Equipment PD-58 (PD-58-a)
Relays and Solenoids PD-67 (PD-67-a)
Welding Equipment PD-81 (PD-81-a)

Monthly, by the 5th (Next report due Dec. 5)

Motor Trucks

Monthly, by the 10th (Next report due Dec. 10)

Airframes PD-13
Mines PD-119
Shipbuilders PD-30 (PD-30-a)
Tanks, light PD-81 (PD-81-a)
Tanks, medium PD-81 (PD-81-a)

Monthly, by the 20th (Next report due Dec. 20)

Laboratories PD-93

Monthly, by the 25th (Next report due Dec. 25)

Shipyards PD-56 (PD-56-a)

Where to go in Washington for Priorities Information

Members of the Priorities Specialists Staff of OPM, capable of rendering assistance on specific commodity problems, are listed below with their room numbers

Priorities Specialists Staff, OPM, New Social Security Building

Telephone Republic 7500

Samuel S. Stratton, technical consultant to director—Room 5714
S. Birss, assistant to director—Room 5714
P. B. Hoppin, assistant to director—Room 5714

Division of Production

Specialist	*Commodity*	*Room No.*
W. G. W. Glos	Head priority specialist	4309
C. Clay Crawford	Aircraft	4421
Walter C. Armstrong	Ordnance	4309
Allen B. Hood	Tanks and combat vehicles	1044
L. K. Vry	Tools	3340
W. C. Wetherill	Shipbuilding	4718
W. C. Wetherill	Construction	4718

Division of Purchases

J. Wilton Peters	Head priority specialist	2066
Charles Smith	Food supply	2627
Walter P. McGowan	Textile, clothing and equipage	2062
Samuel A. Palmer		2064
George G. Orrick		2079
Raymond G. Daly		2062
J. Bedford French	Health supplies and fire equipment	2605
Joseph H. DeVeau	Containers	2060
Charles Dailey		2727
L. Malcolm Slaght	Special assignments	2058
Thomas F. Flaherty		2431
Robert A. Harris		2064

Division of Civilian Supply

John W. Harriman	Head priority specialist	2204*
J. L. Ritchie	Pulp and paper	4036
Francis E. Merrill	Printing and publishing	4036
C. Henri Rush	Lumber and building materials	2238*
Philip B. Hoppin	Plumbing and heating	5714
John J. Moore, Jr.	Electrical appliances and consumers' durable goods	2300*
Fred Lavis, Jr.	Automotive transportation and farm equipment	2748
Austin Cunningham	Industrial and office machinery	2305*
Edward L. Rinkenbach, Jr.		2305*
Robert T. Williams	Rubber, rubber products	3360
Rex M. Beach	State, local government	2133*

Division of Materials

H. K. McCook	Head priority specialist	3359
E. S. Ferguson	Aluminum, magnesium	3305
D. P. Morgan	Chemicals	4062
Lucien Barnes		4062
E. Barrett Mason	Iron and steel	2412
James G. Bowen		2412
W. J. Zepp	Power	2750
Francis W. Fitzpatric		2742
Gaston F. Balme		2750
Fred L. Herron	Cork and asbestos	3360
Stephen P. Dorsey	Nickel	3330
George H. Roll	Tungsten	5194
Paul T. Brady	Copper, zinc	3359
George H. Roll	Manganese, chrome	5194
George H. Roll	Tin, lead	5194
George H. Roll	Mica, graphite	5194
George H. Roll	Miscellaneous minerals	5194

Office of Petroleum Coordinator
(New Interior Building)

James E. Hughes	Head priority specialist	7514
Robert K. Lyle	Petroleum	7514

Division of Export Control
(2501 "Q" Street, N. W.)

Stephen P. Dorsey		120, 2501

*Located in Temporary Building D, Independence Avenue and Fourth Street, S. W.

Field Offices of OPM Division of Priorities

These offices are organized to assist industry answer problems arising from the application of the priorities system. All field offices are under the supervision of L. J. Martin, assistant deputy director, Priorities Field Service, Washington. Listed below are the addresses of all offices opened to date and the names of the office managers.

ATLANTA, GA.
Federal Reserve Bank Bldg., John B. Reeves

BALTIMORE
Baltimore Trust Bldg., T. M. Chandles.

BOSTON
30 Peach St., W. P. Homans.

BUFFALO
M & T Bank Bldg., Paul R. Smith.

CHARLOTTE, N. C.
Liberty Life Bldg., J. E. MacDougell.

CHICAGO
230 South LaSalle St., W. G. Bailey.

CINCINNATI
Union Trust Bldg., Bruce W. Burroughs.

CLEVELAND
Federal Reserve Bldg., W. T. Walker.

DALLAS, TEXAS
Wood & Akard Streets, J. B. Crockett.

DAYTON, OHIO
32 North Main St., H. B. Doty

DENVER
U. S. National Bank Bldg., Virgil L. Board.

DETROIT
7310 Woodward Ave., Walter Hall

HARTFORD, CONN.
805 Main St., E. L. Howard

HELENA, MONT.
Federal Reserve Bank Bldg., Oscar A. Baarson.

HOUSTON, TEXAS
Federal Reserve Bldg., George L. Noble, Jr.

INDIANAPOLIS, IND.
Circle Tower Bldg., Albert O. Evans.

JACKSONVILLE, FLA.
Hildebrandt Bldg., G. H. Andrews.

KANSAS CITY, MO.
Federal Reserve Bank Bldg., Clifford Carr.

KNOXVILLE, TENN.
(Address not announced), Dyer Butterfield.

LOUISVILLE, KY.
Todd Bldg., 4th & Market St., James T. Howington.

LOS ANGELES
1151 South Broadway, G. Howard Hutchins.

MEMPHIS, TENN.
Sterrick Bldg., J. S. Bronson.

MILWAUKEE
First Wisconsin National Bank Bldg., F. J. Tharinger

MINNEAPOLIS
Rand Tower Bldg., Willard F. Kiesner.

NASHVILLE, TENN.
1015 Stohlman Bldg., George S. Gillen.

NEW ORLEANS
(Address not announced), John A. Bechtold.

NEW YORK
25 Broad Street; John B. Pollock.

OKLAHOMA CITY, OKLA.
Federal Reserve Bank Bldg., C. F. Aurand.

PHILADELPHIA
925 Chestnut Street; F. W. Slack.

PITTSBURGH
Grant Street & Ogle Way; C. F. Cruciger.

PORTLAND, ORE.
Bedell Bldg., J. Fred Bergesch.

RICHMOND, VA.
Federal Reserve Bank Bldg., Fred P. Wilmer.

SALT LAKE CITY
Utah Oil Bldg., Ralph E. Bristol.

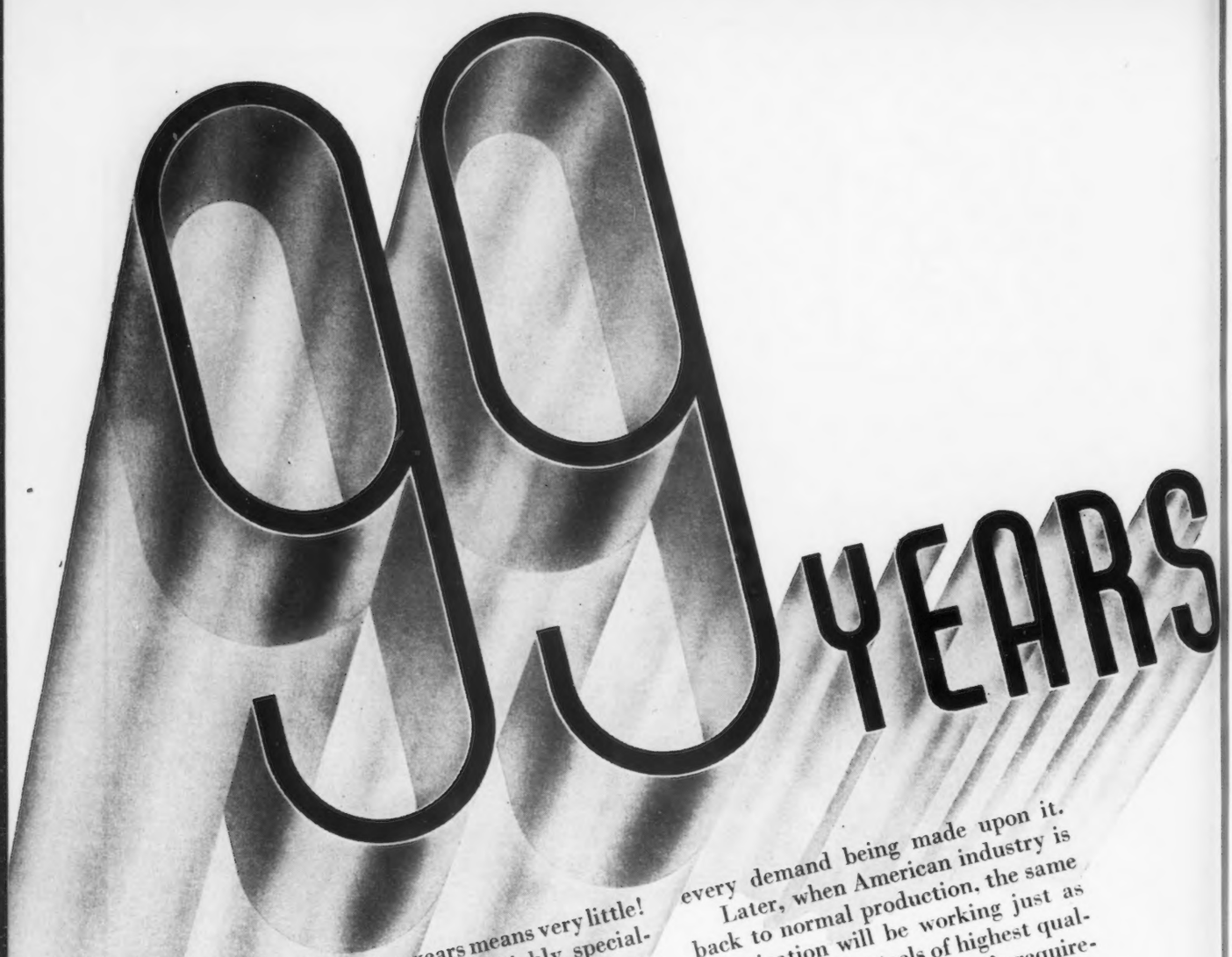
SAN ANTONIO, TEXAS
415 W. French Place, Carl L. Pool.

SAN FRANCISCO
Federal Reserve Bank Bldg., Andrew L. Kerr.

SEATTLE
960 Stuart Bldg., W. D. Shannon.

ST. LOUIS
411 Locust Street, Louis E. Crandall.

TULSA, OKLA.
(Address not announced), A. E. Ballin



● Ninety-nine years means very little! Ninety-nine years of highly specialized experience in the steel business means a great deal; especially when that experience has involved handling huge quantities of steel, in thousands of kinds, shapes and sizes, and serving the varied needs of a host of users in every industry.

Ryerson *can* and *does* pledge that all of the skill and experience gained through 99 years of successful operation, always will vigorously be devoted to the interests of Ryerson customers. In the present period of steel shortage—as in similar periods in the past—the Ryerson organization is bending every effort to meet as nearly as possible every demand being made upon it.

Later, when American industry is back to normal production, the same organization will be working just as hard to provide steels of highest quality to meet every customer's requirement, and to provide them on the immediate basis which is synonymous with the name Ryerson.

We are glad to be 99! We are grateful for the past loyalty of our customers—but more grateful, perhaps, for their cooperation now, in our effort to serve them to the full limit of our resources. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON

THE IRON AGE

DECEMBER 4, 1941

ESTABLISHED 1855

The Plight of the Middleman

PLENTY of proverbs have depicted the plight of the middleman. "Two is company; three is a crowd" is one of them. The eternal, or infernal, triangle must have its third party. And somebody has to be ground between the upper and the nether millstones.

John R. Steelman is today America's outstanding middleman. He is the so-called third arbitrator in the captive mine arbitration board, which is no arbitration board at all. It is two sides with an umpire in the middle.

Dr. Steelman is too good a man to be sacrificed on the altar of political expediency, as he undoubtedly will be. He is the "ace" conciliator of the Department of Labor and in this instance, as in the game of bridge or poker, the ace is more potent than the queen.

America needs to keep Dr. Steelman as its ace conciliator. It would have done well to have made him Secretary of Labor, for in that capacity he would have really functioned, in marked contrast to the pitiful inadequacy of the incumbent.

But now Dr. Steelman must go overboard; must walk the plank, as have a long and distinguished list of faithful servants of the present administration.

He has been thrust, so to speak, upon the horns of a dilemma, from which there is no escape except by being gored.

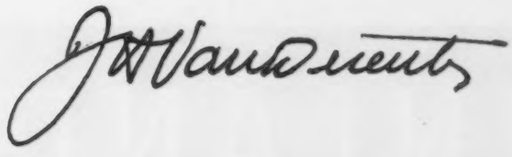
Consider, if you please, what is signified in the setting up of this three man "arbitration" board for the "captive" mine industry.

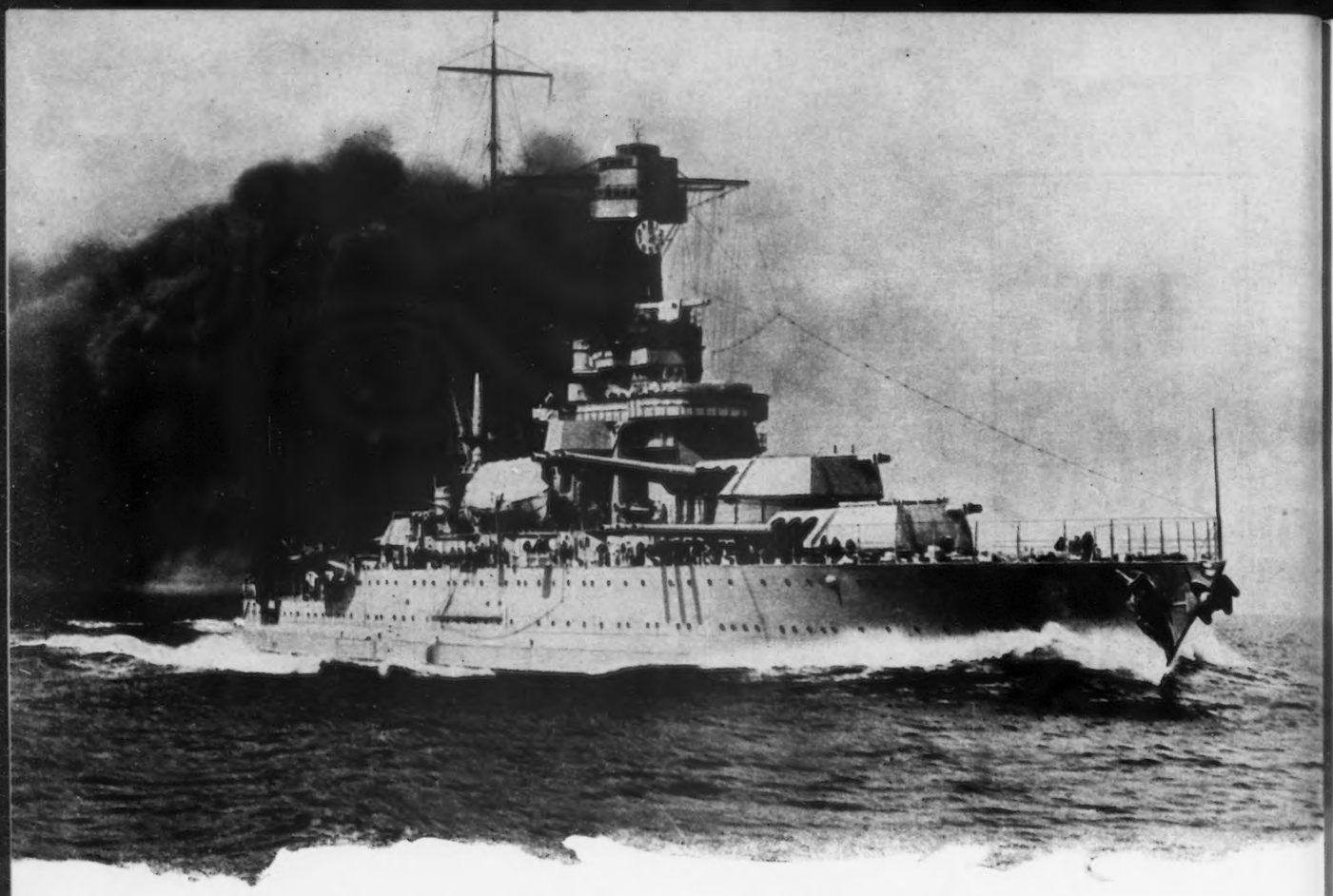
Here is Mr. John Lewis, whose mind on this subject could not be changed by a first class California earthquake and whose decision could be written in advance by any man, woman or kindergarten child in America. Mr. John Lewis, who should have been automatically disqualified from membership by his previous impudent rejection of the President's repeated appeals to reason.

Then there is Mr. Benjamin F. Fairless, head of the U. S. Steel Corp., who represents the captive mine owners. And Mr. Fairless, while he is willing to accept the President's terms, as the representative of his industry must of necessity stand up for his industry in resisting the entering wedge of the closed shop and the checkoff in the steel industry. And that's all there is to this captive mine controversy.

So that leaves Dr. Steelman as the middleman. The man who must cast the deciding vote and who must make the momentous decision. And whatever that decision may be, Dr. Steelman will thereafter, be through as a labor conciliator.

To paraphrase a famous expression: "Oh politics, what crimes are committed in thy name!"





At Inland "Full Speed Ahead" Helps Build Our Two-Ocean Navy

The United States is rapidly building the greatest Navy the world has ever known—a powerful two-ocean Navy to protect our shores and keep the sea lanes open, in the Pacific as well as in the Atlantic.

To the shipyards in which these vessels are being built and to manufacturers throughout the land, who are producing parts and equipment for them, Inland is shipping thousands of tons of steel products. This steel is being used not only for the great "ships of the line" but also for many less spectacular but very essential craft such as submarine chasers, tankers, seaplane tenders, transports, lighters and barges.

At Inland, as in the Navy, it is "full speed ahead" for America's defense. We have broken many production records—we are operating as close to capacity as the available supply of raw materials will permit—and still making the finest steel in our history. And, of course, our mills are being scheduled in strict conformance with priority ratings and allocations.

National Defense dominates our business today—as it should. It is our No. 1 Job, and we are proud of it.

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Surface Structures and Chemistry of

Heat Treated 18-4-1 Steel

By W. A. SCHLEGEL
Metallurgical Department, Carpenter Steel Co., Reading, Pa.

THROUGHOUT the centuries metals have been used for the advancement of civilization, and a good index of progress has been the steady increase in the use of the many different metals. Today, as never before, these metals and their numerous alloys are in urgent demand, not only for normal and civilian needs but more specifically for the protection and defense of the country's safety. The large national defense program is straining every metal working industry beyond its normal producing capacity and any failures of equipment cause bottlenecks in production.

Tools, such as drills, taps, reamers, lathe tools, broaches, planer tools, end mills, form cutters, etc., constitute a vital part of the country's industrial equipment and virtually determine the ability to produce. An automobile without the steering mechanism is of very little use. Likewise many modern machines with their fine adjustments, ease of operation, automatic controls, etc., would be of little use without satisfactory tools.

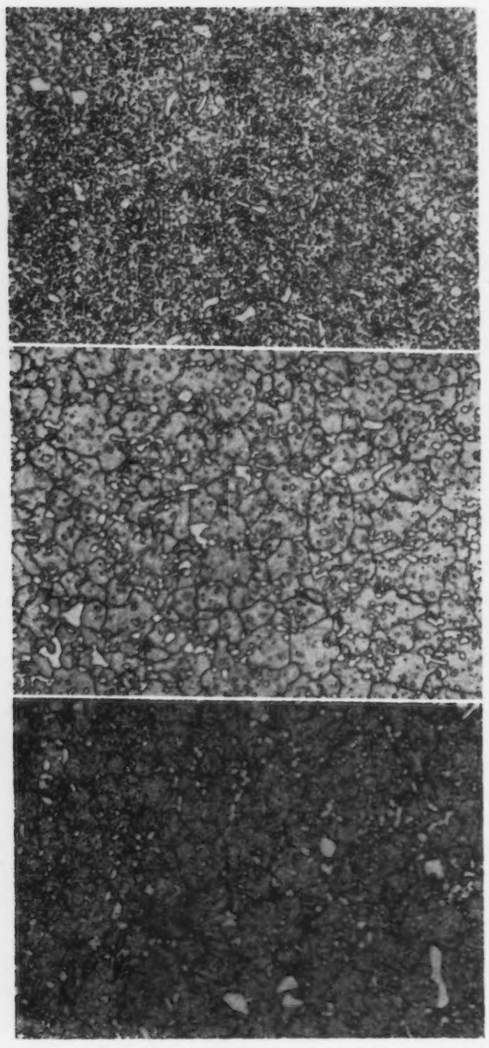
The greater need for production necessitates faster operating speeds, greater accuracy, keen cutting edges, and tools which will operate satisfactorily at relatively high temperatures and still maintain close tolerances. The only steels which can satisfy these demands are high speed steels, and today they are being used extensively for the manufacture of tools of all descriptions. A very large percentage of these tools have been made, and will continue to be made, from the 18-4-1 type high speed steel (18 per cent tungsten, 4 per cent chromium, 1 per cent vanadium). Because of the present necessity of conserving tungsten, the molybdenum high speed steels will be used more extensively than heretofore.

For other articles on high speed steel, both of the tungsten and molybdenum types, see THE IRON AGE, issues of July 3, 1941, p. 45; Sept. 25, 1941, p. 33; Oct. 2, 1941, p. 39; and Dec. 26, 1940, p. 35.

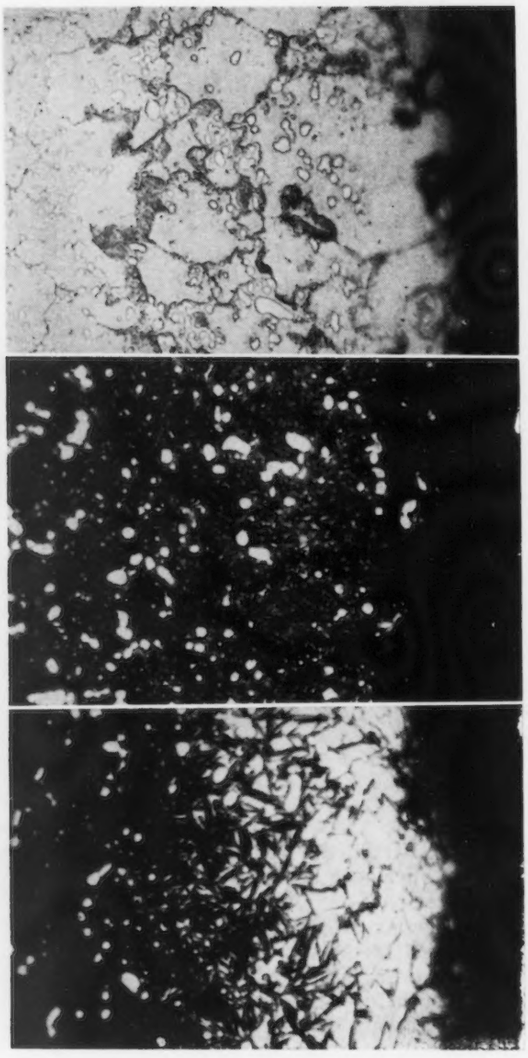
The usefulness of any tool, assuming that the proper steel was selected, that it was properly designed, and that it was made accurately according to design, is determined to a very large extent, by its heat treatment. This is especially true if tools which have been made from high speed steel, since extremely high temperatures must be employed for successful heat treating. The surface of a very large majority of tools determines how successful the heat treatment has been, since the life of the tools greatly deepnds upon the surface condition. Therefore, since the surface of the tool, or that immediate vicinity, plays such an important part, it is well to know what chemical changes may take place during the hardening and tempering operations.

Decarburized tools are extremely annoying, often necessitating excessive grinding and other added operations before the tools are satisfactory for use. In many instances the tools, as determined by hardness tests, are satisfactory, yet they show poor performance records due to lack of wear resistance caused by partial decarburization. In contrast, tools which are slightly carburized during heat treatment will have a hard, wear-resistant surface, and often show extraordinary production results. Many tools after heat treating are ground and the carburized case may be entirely removed by this operation. Regardless of whether or not this material is removed, carburization is desirable, because when it does take place, it is impossible for decarburization to occur.

There are at present many types of high speed steel in use and the data given herewith, to the best of the author's knowledge, may not necessarily apply to steels other than the 18-4-1 type. However, these data were obtained on the



FIGS. 1 to 3—Characteristic structures of 18-4-1 high speed steel, at 500 diameters. Fig. 1 (above)—Annealed structure. Fig. 2 (center)—Oil treated from 2350 deg. Fig. 3 (bottom)—Oil treated from 2350 deg. and drawn from 1050 deg. F.



FIGS. 4 to 6—Relation of chemical change to microstructure. Fig. 4 (above)—Effect of decarburization on microstructure; at 500 diameters. Fig. 5 (center)—Neutral steel, with neither carburization nor decarburization; at 1000 diameters. Fig. 6 (bottom)—Effect of carburization on microstructure at 1000 diameters.

18-4-1 high speed steel, and their applicability to other steels will have to be determined.

It has been the author's privilege to be associated with a tool steel manufacturing concern which has had over a half century of experience in the manufacture of high speed and tool steels and their related problems. It is the author's hope that the information contained in this paper will be of some assistance to tool manufacturers in helping to produce better and more efficient tools.

The term "surface chemistry" as used in this paper relates to the effect that changes in chemical composition have upon hardness and microstructure and therefore the usefulness of heat treated tools. The element carbon is more influential in producing hardness than any of the elements found in this type of steel. Any change in the percentage of carbon, therefore, will be reflected in hardness and microstructure, and consequently in wear resistance. Since carbon is so important, the chemistry centers primarily around this element.

During the heat treatment of tools made from this steel, there are three, and only three, major changes which may take place. The first of these is the loss of carbon, which is generally described as decarburization. In terms of equilibrium, it might be described as an unbalanced condition in which the carbon leaving the surface is greater than the amount of carbon entering the steel. The second condition which may exist is one where there is neither carburization nor decarburization. This condition is often referred to as producing a neutral surface. Again, in terms of equilibrium, this may be described as a condition wherein the amount of carbon leaving the surface is equal to the amount of carbon returning to the surface. The third condition is referred to as carburization. In this instance, the amount of carbon entering the surface is greater than the amount of carbon which is leav-

ing the surface. There can be extreme cases of conditions Nos. 1 and 3, i.e., the tools can be very badly decarburized or they can be slightly decarburized. On the other hand, it is possible to find tools that are slightly carburized while others may show extreme carburization.

The reactions which produce any of the foregoing conditions are extremely difficult to determine. They may be the result of a direct interaction between the media surrounding the steel, or they may be a product of a secondary or intermediate reaction. For instance, when furnaces are employed, it is frequently the practice to make gas analyses, and naturally these determinations must be made at room temperature. Whether these represent a true condition of the furnace atmosphere at elevated temperatures is not known, nor is the catalytic action of the steel with the media surrounding it known.

Therefore, in view of these difficulties, the primary purpose of the research was to determine structural and chemical changes occurring on the surface when treating this type of steel under various conditions such as smith forge, furnace, and salt bath heating. When furnaces were employed, time, temperature and atmospheres were studied using gas, oil and controlled-atmosphere electric furnaces. Included among the furnace treated tests were some special heat treating procedures, including borax coating and treating from a carbon block. Attention was paid to the structure and amount of oxide film which invariably forms regardless of the method of heating. When carburization was encountered, its behavior during tempering was studied in detail. A theory is postulated to explain the structural and chemical changes which take place under the above mentioned conditions.

Conditions of Investigation

As previously stated, all experiments were made on 18 4-1 high speed steel. Any changes in chemical composition can be determined only if the chemistry of the surface is known before heat treatment. These data were secured by turning bars to eliminate any bar surface condition. Usually 1/16-in. or more was removed from the sides of all samples, and carbon determinations made on the machined sections. The analysis of the carbon previous to heat treating served as a base line for the interpretation of results, and at the same time insured against any ill effects resulting from a hot rolled surface. After the bars were machined, they were carefully cleaned to eliminate any grease which might have adhered to the surface during the machining operations. After cleaning, clean canvas gloves were worn when handling the sections to prevent contamination by any foreign material. During heat treatment, the samples were handled with tongs which had been burned free from grease or oil.

After hardening, microspecimens were removed from each sample for this phase of the work. This served to eliminate any end effect when chemical analyses were made.

The remaining portions of the specimens were then cleaned in gasoline, heated to a temperature of about 1000 deg. F., to burn off the gasoline and oil, followed by immersion in a lead pot at a temperature of about 1400 deg. F. This heating to 1400 deg. F. served as a semi-anneal for subsequent machining of the specimens. Prior to the semi-annealing, the lead was thoroughly deoxidized and covered with a salt which prevented further oxidation of the lead. This salt also provided a coating for the samples when cooled in lime to room temperature. After specimens were cold, they were cleaned in 1:1 HCl to remove the salt and any oxide which formed during the hardening of the steel. The specimens were in the acid only long enough to insure a clean, white surface. Round sections were used throughout the experiment when chemical analyses were desired, since they offered an easy method of obtaining chips.

Investigations were made with an electric atmosphere controlled furnace, gas fired furnace, oil fired furnace, and two salt baths. When furnaces were employed, gas analyses were made, and the gases were analyzed for carbon dioxide, oxygen and carbon monoxide. Carbon dioxide was determined with a solution of potassium hydroxide of the proper specific gravity (1.55). The oxygen content was determined with pyrogallate, while the percentage of carbon monoxide was obtained with a solution commercially known as Co-sorbent. It is recognized that furnace atmospheres contain gases other than those determined by analysis. These other gases consist of nitrogen, hydrogen, moisture and hydrocarbons. In the event that oxidizing atmospheres are employed, the hydrogen and the hydrocarbons will not be present.

It is known that the temperature employed during the heat treatment of this type of steel is very important, and consequently throughout the work, temperatures were carefully checked to insure a reasonable degree of accuracy. With the electric furnace, platinum-platinum-rhodium couples were employed, whereas chromel-alumel couples were used with the gas and oil fired furnaces. In addition to the usual pyrometric equipment used on these individual furnaces, check temperatures were obtained with a Leeds & Northrup Model "C" millivoltmeter, and also with a wall-type indicator which was carefully calibrated and which had a temperature range of 700 deg. to 2500 deg. F.

During the investigation, both chemical and microscopic analyses were made of the sections when treated under specific conditions of time, temperature and atmosphere. This procedure permitted a correlation between chemical changes and microstructures. It might be well to include at this point the three typical structures of this type of steel, as shown in Figs. 1 to 3 inclusive. All of these structures were on an inside cross-sectional area and represented normal structures as follows:

Fig. 1 represents the annealed structure and consists of complex carbides embedded in a matrix of iron which is highly alloyed with tungsten, chromium and vanadium, and also some minor amounts of manganese and silicon. Fig. 2 shows the structure of this steel in the as-hardened condition, when oil treated from 2350 deg. F., and consists of tetragonal martensite, some retained austenite, and excess carbides. The etching reveals a distinct grain boundary structure. Fig. 3 is a typical structure after oil treating from 2350 deg. F., and tempering at 1050 deg. F., and consists of drawn martensite and excess carbides. Usually after drawing at this temperature for the proper length of time, the grain boundaries are practically invisible when etched in a 2 per cent nital solution. When drawing in a temperature range of 1050 deg. to 1100 deg. F., most of the retained austenite which was present in the as-hardened condition will have decomposed into martensite. These

three photomicrographs should refresh memories regarding the typical structures of this steel in the annealed, hardened and tempered conditions.

In the earlier part of this paper, it was indicated that changes in chemical composition affect the microstructure, and it was stated that one of three reactions or conditions could take place during the heat treatment:

Condition No. 1 stated that decarburization might take place. The effect of decarburization on the microstructure is shown in Fig. 4. The steel here had been oil treated from 2350 deg. F., but not tempered.

Condition No. 2 stated that the surface of the steel remained neutral, and the microstructure for the neutral surface of steel oil treated from 2350 deg. F. and tempered at 1050 deg. F. is shown in Fig. 5.

The third possible reaction consisted of carburizing the surface of the steel during heat treatment. This condition as it affects microstructure is shown in Fig. 6, where the steel had been oil treated at 2350 deg. F. and tempered at 1050 deg. F.

Figs. 4 to 6 inclusive are typical of structures which may be found as a result of chemical surface changes.

TABLE I

Effect of Preheating Atmospheres at 1550 Deg. F. on Surface Carbons

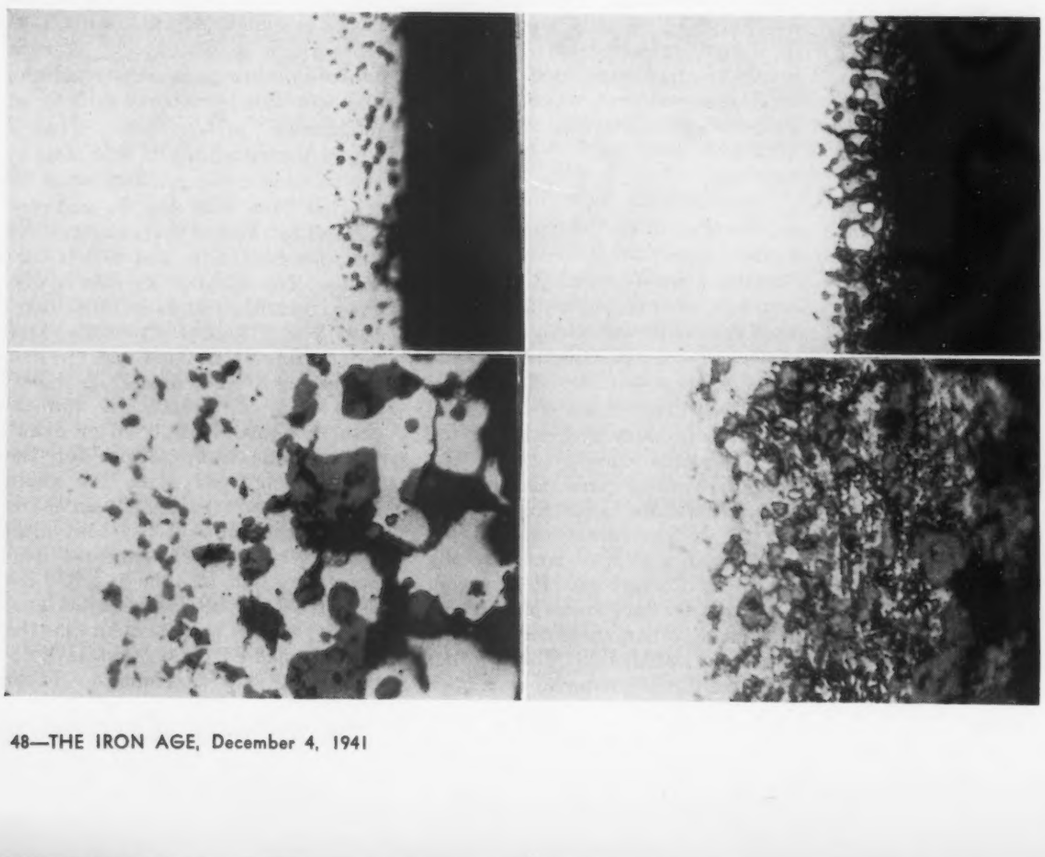
Atmospheres			Carbon Step Down Tests		
			First Cut 0.0000 to 0.0025 In.,	Second Cut 0.0025 to 0.0050 In.,	Third Cut 0.0050 to 0.0075 In.,
CO_2	O_2	CO	Per Cent	Per Cent	Per Cent
8.6	0.0	8.0	0.73	0.73	0.72
9.7	0.0	6.0	0.76	0.74	0.72
11.0	0.0	3.8	0.74	0.73	0.72
12.0	0.0	2.2	0.76	0.74	0.74
13.5	0.0	0.0	0.74	0.73	0.73
12.3	1.9	0.0	0.76	0.74	0.73
10.6	4.0	0.0	0.73	0.72	0.72

Preheated in an electrically heated furnace. Propane gas used for controlling atmospheres. Time in furnace, 30 min.; lime cooled; cleaned in 1:1 HCl. Size of section, 1 in. round x 3 in. long. Carbon analysis on machined bar, prior to preheating, 0.72 to 0.74 per cent.

Metal Oxide Zone

The changed zone under any treated surface may be described as a metal-oxide zone. This zone may be defined as a mixture of oxide and the matrix of the steel. It is often referred to as scale, and has been interpreted as such. As a matter of fact, it is a mixture of scale, partially oxidized material and matrix. This condition is always found between the full scale and the sound matrix. The depth of this metal-oxide zone is determined very largely by the type of equipment used. With the usual type furnaces, the depth of this zone after hardening, tempering, and sand blasting will range from 0.0002 in. to 0.0050 in., and is dependent upon time, temperature and furnace atmosphere. When an atmosphere of 8 to 12 per cent carbon monoxide is employed with the commonly used hardening furnace at a temperature of 2350 deg. F. for normal times, the depth of the metal-oxide zone will be only a few ten-thousandths of an inch. With salt baths or some of the more recently designed controlled atmosphere furnaces, the depth of this zone will be practically negligible.

However, regardless of the method of heat treatment, some metal-oxide is bound to form, since the surface of the tool after hardening and tempering will be differ-



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FIGS. 7 to 10—Structures of metal oxide zone. Fig. 7 (upper left)—Heated to 2350 deg. in 8 per cent CO, and approximately 2 min. at heat; unetched and at 1000 diameters. Fig. 8 (upper right)—Same as Fig. 7, after etching for 30 sec. in 2 per cent nital. Fig. 9 (lower left)—Heated to 2350 deg. in 8 per cent CO, and ½ hr. at temperature; unetched and at 1000 diameters. Fig. 10 (lower right)—Same as Fig. 9; etched in 2 per nital, 30 sec.

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ent in appearance from that previous to heat treatment. Fig. 7 shows the structure of this metal-oxide zone obtained in an 8 per cent carbon monoxide atmosphere for normal heating times when hardened from a temperature of 2350 deg. F. The microspecimen was unetched and the structure consists of oxide embedded in the matrix. However, if this constituent is lightly etched, it will show that it is composed of oxides and partially oxidized material as shown in Fig. 8. Fig. 9 shows the structure of this metal-oxide zone on the surface of a section which was held ½ hr. at 2350 deg. F. in an 8 per cent carbon monoxide atmosphere.

It will be seen that the depth of metal-oxide zone in Fig. 9 is decidedly greater than in Figs. 7 and 8. Fig. 10 is the same as Fig 9 after etching 30 sec. in 2 per cent nital. Therefore, when treating this type steel it is desirable to keep the depth of this zone at a minimum, and this may be accomplished when furnace treating by using an 8 to 12 per cent carbon monoxide atmosphere. The small amount of the metal-oxide zone obtained in this atmosphere range will have little or no effect on tools which are not ground, such as form cutters. Tools which are ground after hardening will naturally be free of this condition.

Treating From a Smith Forge

One of the earliest methods of treating high speed steels was from a smith forge fire. The use of this type of equipment has declined materially within the last few years because of better high temperature furnaces and more accurate temperature control. However, this method of heating is used under some conditions, and, in order to learn what might take place during heating, a number of sections was heated in a good bed of coke. The temperatures were measured with an optical pyrometer and showed 2380 deg. F. After heating, sections were oil quenched and examined microscopically and chemically for changes in surface composition. It was found that this type of heating produced non-uniform results. The surface was found to be both carburized and decarburized, and in some places actually fused. Fig. 11 shows a badly decarburized area, which occurred on a number of samples heated in this manner. Fig. 12 shows a surface that was not only highly carburized but apparently overheated to such an extent that the carbides started to become angular. Fig. 13 shows actual fusion, as indicated by the formation of eutectic, characterized by the "herringbone" structure of the carbide. Figs. 11, 12 and 13 were obtained from the same test section and are characteristic of structures found on several different samples treated under identical conditions.

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FIGS. 11 to 13—Structure obtained with forge fire heating. Fig. 11 (top) — Oil treated and tempered, showing decarburization; at 1000 diameters. Fig. 12 (center)—Oil treated and tempered, showing carburization and overheating; at 1000 diameters. Fig. 13 (bottom) —Oil treated and tempered, showing actual fusion; at 1000 diameters. All three structures obtained on same section.

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When the surfaces of these sections were explored with a file, it was found that some areas were quite soft, while others were file hard. Moreover, chemical analyses showed on an average a loss in surface carbon. These results indicate that this type of equipment should not be used for the heat treatment of fine edged tools, such as taps, reamers, etc., since tools treated in this manner would give unsatisfactory results. This type of equipment may be used only on the so-called single point tools, since they will permit a generous amount of grinding after heat-treating, as, for example, heavy roughing lathe or planer tools.

Preheating

The majority of tools made from high speed steel are treated from either fuel-fired or electrically heated furnaces. The first step in this method of treating consists in preheating the steel, followed by superheating to a temperature of approximately 2350 to 2375 deg. F. Since preheating is employed, it becomes necessary to determine whether or not this step in the treating operation will affect the chemical composition of the surface.

Sections 1 in. round were preheated in a controlled atmosphere furnace to a temperature of 1550 deg. F. under atmospheric condi-

tions ranging from 8 per cent carbon monoxide to 4 per cent oxygen. The length of time for the sections to reach this temperature was approximately 20 min., followed by holding at heat 10 min. These sections were lime cooled, cleaned in acid, and carbon determinations made. These data are given in Table I. The carbon analysis of the bar prior to preheating was 0.72 to 0.74 per cent. These results show that the surface during the preheating operation did not change within the atmosphere range investigated and for the temperature employed. The preheating temperature generally ranges between 1500 deg. and 1650 deg. F., and the time of preheating is often determined by the size of the superheating furnace.

To gather more data on this phase of the heat treating operation, a number of samples was heated to 1600 deg. to 1650 deg. F. in both carbon monoxide and oxidizing atmospheres. The time at heat in the preheat furnace ranged from 0 to 20 min. The surface carbon of the material previous to preheating was 0.74 to 0.75 per cent. After heating under various conditions of temperature, atmosphere and time, the sections were oil quenched, annealed in lead, cooled in lime, cleaned in acid, and turnings obtained for analysis. These results are shown in Table II, and again no appreciable change in surface carbon was noticed. Therefore, it is safe to conclude that when a temperature of 1500 deg. to 1600 deg. F. is employed, and the time at the preheating temperature is not excessive, neither carburization nor decarburization will take place. However, it is recommended that a slightly reducing atmosphere (2 to 6 per cent carbon monoxide) should be employed since this will result in the least amount of scale, and therefore produce a better surface after the final hardening.

Ed. Note:—Next week the author continues with data on the effect of superheating, water quenching, effect of temperature, etc.

TABLE II

Effect of Preheating in Reducing and Oxidizing Atmospheres at 1600 Deg. and 1650 Deg. F.

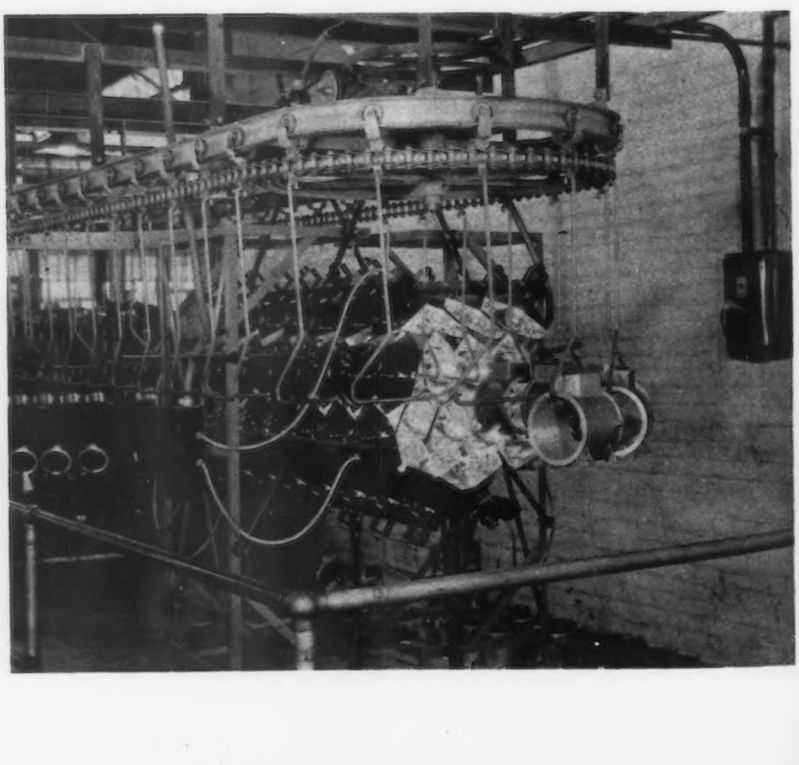
Preheating Temperature Deg. F.	Atmosphere, Per Cent	Time Held at Heat, Min.	Carbon Step Down Tests — First Cut 0.0000 to 0.0025 In.	Second Cut 0.0025 to 0.0050 In.	Third Cut 0.0050 to 0.0075 In.
1600	2.0 CO	0	0.81	0.76	0.75
1600	2.0 CO	5	0.78	0.77	0.76
1600	2.0 CO	10	0.78	0.75	0.75
1600	2.0 CO	15	0.79	0.73	0.74
1600	2.0 CO	20	0.82	0.79	0.74
1650	2.0 CO	0	0.76	0.75	0.74
1650	2.0 CO	5	0.76	0.74	0.74
1650	2.0 CO	15	0.75	0.74	0.74
1600	2.0 O_2	0	0.76	0.74	0.74
1600	2.0 O_2	5	0.76	0.75	0.74
1600	2.0 O_2	10	0.75	0.74	0.74
1600	2.0 O_2	15	0.76	0.75	0.74
1600	2.0 O_2	20	0.76	0.74	0.74
1650	2.0 O_2	0	0.75	0.75	0.75
1650	2.0 O_2	5	0.75	0.74	0.75
1650	2.0 O_2	15	0.74	0.73	0.73

Preheated in an electrically heated furnace. Propane gas used for controlling atmospheres. Section 1 in. round x 3 in. long; oil treated, annealed in lead, lime cooled. Cleaned in 1:1 HCl. Carbon of machined bar = 0.74 to 0.75 per cent.

Shrink Fit Motor Frames

TO reduce rejects in press fitting of aluminum and steel parts, infra-red heating is used at the Westinghouse small motor plant at Lima, Ohio. The 6.75 in. bore in the aluminum frames, which are heated to 302 deg. F., expands 0.20 in., permitting wound primaries to be dropped into place.

A rotary conveyor traveling 30 ft. per min. carries the aluminum motor frames through a tunnel (see accompanying illustration) formed by a batter of 56 375-watt lamps. The shrink fit allowance produced by infra-red heating is much greater than that deemed practical for a press fit. Until this method was discovered, the mechanical operation of obtaining proper fits between hard and soft metal parts has always been more or less unsatisfactory.



A practical Wage Incentive Plan

By HARRY F. BLAKE
Supervisor of Standards Department, Sullivan Machinery Co., Claremont, N. H.
and
FRANCIS A. WESTBROOK
Consulting Engineer

This revised wage incentive plan has been put into effect by the Sullivan Machinery Co., Claremont, N. H. It is very definitely increasing machine shop production, eliminating production bottlenecks, reducing labor costs, and increasing machine operator and foreman wages.

THE Sullivan Machinery Co., at its Claremont, N. H., plant, recently instituted a new and revised wage incentive system in its machine shop affecting some 400 men on standards. It has now been in operation long enough to show that the labor cost has been reduced on the average by 32 per cent. At the same time, the machine operators have averaged an increase of 30 per cent in hourly wages without reducing the original base rates. The resulting increase in production per machine has tended to eliminate bottlenecks at several points, and has made it possible to avoid a second shift at such locations, with all the extra costs that would have been involved.

The wage incentive plan formerly in operation at the plant was discontinued because labor costs got out of line rather seriously. The new system, especially designed to meet present conditions, was installed with such satisfactory results that it is now being extended to other departments.

A further advantage of the new wage incentive system is that the standard times and costs which have been developed enables orders to be scheduled through the machine shop and to selling prices calculated with much greater accuracy than was heretofore possible.

The standards used are based on time studies of the different operations on each machine. These studies are made by the standards department and are carefully fitted to local conditions in the machine shop departments by making a number of time studies at each machine for the production of such parts as are made on it, or operations performed on it. When representative studies have been accumulated it becomes possible to select from them a proper standard time for each machine, making necessary adjustments for covering the handling of the machine, setting-up-time, etc.

Each man working under the plan is guaranteed a basic rate per hour, with the expectation that he will be able to earn a substantial bonus. When a machine operator is given an order to make a certain number of parts, he can take the standard time to complete them and get the basic guaranteed pay, or he can do the work in less time and still get the same amount of pay, increasing his hourly earnings. He can then go ahead on another order and do the same thing. In this way a good operator is able to keep his hourly wages, or total earnings, about 30 per cent above the standard rate, at the same time increasing the production of his machine as already outlined.

All standards are based on the idea that a good operator can make a 33 per cent premium, thus providing a real incentive. Standards are never reduced so long as methods, design of parts, fixtures, etc., remain unchanged, but they may be raised if a mistake has been made in the setting of any standards. When new machines, methods or fixtures are introduced, or when other progressive developments in production are realized new standards are set up, based on the careful studies and analyses, just as are the standards that are replaced.

In case an operator complains that the standard time for a job is too short he is instructed to get the foreman to help him. If the two together still find that the standard time is not right the foreman contacts the standards deparment and quite frequently a new time study to check with the estimating sheets is made. If necessary the standard time is revised, and on occasion the standards department is able to make suggestions which

DAILY CHECKING CARD

ORDER NUMBER	PART NUMBER AND NAME	QN'TY IN ORDER	OPER. NO.	JOB IN	JOB OUT	MACH. MINS. RUN	% N.W.T.	MINS. ON STD.	HOURS ON STD.	STD. MINS. SET UP	STD. MINS. PER PC.	NO. PCS. FIN.	STD. MINS. PROD.	BASE RATE	B.R. PER MIN.	TOTAL STD. COST
M-46283	4139-CM	8	3	1:30	2:25			55	.9	53.	3.2	8	79	.63	.0105	83
"	"	8	4	2:25	6:00			215	3.6	68.	19.1	8	221	.63	"	2 32

M.A.A.	HOURS $	COST OF MINS. = STD. & GUAR.	OVER-TIME 63	TOTALS 270			300	TOTAL STD. COST 3. 15

A IN 7	P IN 1	MINS. IN SHOP 600	STD. MIN PRODUCED 300	DAY WORK	MIN. 330	COST	DAY WAGES 6.30	TOTAL CREDITS 3. 47
M OUT 12.	M OUT 06	TOTAL CREDITS 330	STD. MIN. REQUIRED 270	ALLOWED			PREMIUM .32	MINS. - STD.
HOURS IN SHOP 10	HOURS ON STD. 4.5	MINS. ON STD. 270	PREMIUM MINUTES 30	M.A.A.				MINS. = H.R. GUAR.
PERSONAL RATE .63	BASE RATE .63	MIN. HR. SCHED. 60	MINS. ±STD.	INDIRECT			OVERTIME .63	OVERTIME .63
P.R. PER MIN. .0105	B.R. PER MIN. .0105	MIN. HR. PERF. 67	MINS. ± GUAR.	TOTAL CREDITS	330	3.47	TOTAL PAY 7.25	TOTAL COST 7 20

CLOCK NO. 509 NAME Osgood M. DEPT. 5 DATE 8-26-40

Fig. 3—Daily checking card.

TIME WITHOUT STANDARDS

TIME START	TIME FIN.	SHOP ORDER & PIECE NUMBER (REMARKS)	CHARGE DEPT.	CHARGE A/C	HOURS ON JOB	LABOR COST	DAY WORK REG. PROD.	DAY WORK REOP. OTHER DEPT.	DAY WORK TOOLS	DAY WORK MISC.	ALLOWED TIME WAITING	ALLOWED TIME BREAK DOWN	ALLOWED TIME REOP. THIS DEPT.	ALLOWED TIME MISC.	INDIRECT TIME SUP.	INDIRECT TIME HAND.	INDIRECT TIME MAIN.	INDIRECT TIME MISC.
7:00	8:25	M-45734-2482-CM			1.4	.89	.85											
8:25	1:30	M-48763-11531-CM			4.1	2.58	2.45											
		TOTALS							3.30									

	CAUSE	STOP	START	DOWN	CAUSE	STOP	START	DOWN	CAUSE	STOP	START	DOWN	CAUSE	STOP	START	DOWN
PIECE NO.			OPER.				OPER.				OPER.				OPER.	
RECORD OF MACH. DOWN TIME																
PIECE NO.			OPER.				OPER.				OPER.				OPER.	
RECORD OF MACH. DOWN TIME																

PREMIUM POSTING SHEET

DEPT. 50 WEEK ENDING Sept. 14 1940

	MON.	TUES.	WED.	THUR.	FRI.	SAT.	TOTAL
NO. 5001 NAME Smith							
HOURS	10.-	10.-	10.-	8.7	10.-		48.7
H.O.S.	6.6	3.8	4.7	5.4	6.1		26.6
STD. M.	457	241	383	361	476		1918
PERF.	69	63	81	67	78		72.
PREM.	.48	—	.88	.03	.86		2.25
NO. 5004 NAME Dale							
HOURS	10.-	10.-	10.-	8.7	10.-		48.7
H.O.S.	9.3	2.5	3.7	6.5	2.7		24.7
STD. M.	587	160	245	504	209		1705
PERF.	64	64	67	78	78		69.
PREM.	1.66	.40	.92	1.91	.91		5.80
NO. 5005 NAME Jones							
HOURS	10.-	10.-	10.-	8.7	10.-		48.7
H.O.S.	10.-	8.4	10.-	8.5	4.2		41.1
STD. M.	876	525	769	875	299		3344
PERF.	88	62	77	103	72		81.
PREM.	2.70	.04	1.58	3.66	.43		8.41
NO. 5007 NAME White							
HOURS	10.-	10.-	10.-	8.7	10.-		48.7
H.O.S.	4.5	7.1	10.	8.5	5.5		35.6
STD. M.	300	593	919	826	465		3103
PERF.	67	84	92	97	85		87
PREM.	.32	1.73	2.66	3.32	1.42		9.45
NO. 5010 NAME Adams							
HOURS	10.-	10.-	10.-	8.6	10.-		48.6
H.O.S.	6.6	7.5	6.5	2.1	6.4		29.1
STD. M.	357	444	642	144	565		2152
PERF.	54	60	100	69	89		74.
PREM.	—	.42	3.07	.32	2.30		6.11
NO. 5011 NAME Brown							
HOURS	8.-	8.-	8.-	7.7	8.-		39.7
H.O.S.	8.-	8.-	8.-	7.5	4.-		35.5
STD. M.	506	727	752	688	447		3120
PERF.	63	91	94	92	112		88.
PREM.	.59	2.91	3.17	2.80	2.33		11.80
NO. 5014 NAME Tittle							
HOURS	8.-	8.-	8.-	7.7	8.-		39.7
H.O.S.	4.-	7.2	5.9	2.4	4.3		23.8
STD. M.	253	315	451	302	530		1751
PERF.	63	44	76	83	123		74.
PREM.	—	—	.81	.47	2.56		3.84
NO. 5015 NAME Johnson							
HOURS	8.-	8.-	8.-	7.7	8.-		39.7
H.O.S.			4.8	6.9	2.5		14.2
STD. M.			505	464	182		1151
PERF.			105	67	73		81.
PREM.			2.48	1.08	.55		4.11

	MON.	TUES.	WED.	THUR.	FRI.	SAT.	TOTAL
NO. 5018 NAME Hall							
HOURS	10-	10-	10-	10-	10-		50-
H.O.S.	10-	8.5	10-	10-	9.8		48.3
STD. M.	682	547	734	943	768		3674
PERF.	68	64	73	94	79		76.
PREM.	1.00	.50	1.57	3.87	2.11		9.03
NO. 5020 NAME Miller							
HOURS	10-	10-	10-	10-	10-		50-
H.O.S.			5.1	9.5	9.8		24.4
STD. M.			361	561	756		1578
PERF.			51	59	78		63.
PREM.			—	—	1.98		1.98
NO. 5021 NAME Cady							
HOURS	10-	10-	10-	10-	10-		50-
H.O.S.	10-	10-	10-	10-	9.8		49.8
STD. M.	571	644	571	1005	762		3553
PERF.	57	64	57	101	78		71.
PREM.	—	.77	—	4.56	2.15		7.48
NO. 5022 NAME Perry							
HOURS	10-	10-	10-	10-	10-		50-
H.O.S.	10-	10-	10-	10-	9.8		49.8
STD. M.	619	619	1697	619	604		4158
PERF.	62	62	170	62	62		83.
PREM.	—	—	11.32	—	—		11.32
NO. 5024 NAME Crase							
HOURS	10-	10-	10-	10-	10-		50-
H.O.S.			10-	10-	9.8		29.8
STD. M.			739	818	788		2345
PERF.			74	82	81		79
PREM.			2.06	2.88	2.72		7.66
NO. 5025 NAME Mason							
HOURS	10-	10-	10-	10-	10-		50-
H.O.S.				10-	9.8		19.8
STD. M.				335	365		700
PERF.				34	37		35.
PREM.				—	—		—
NO. 5027 NAME Hale							
HOURS	10-	10-	10-	8.7	9-		47.7
H.O.S.	10-	4.8	7.6	8.3	8.2		38.9
STD. M.	840	392	607	683	686		3208
PERF.	84	83	80	82	84		82
PREM.	2.12	.93	1.29	1.63	1.73		7.70
NO. NAME Totals							
HOURS	144-	144-	144-	135.2	143		710.2
H.O.S.	89-	77.8	106.3	115.6	102.7		491.4
STD. M.	6048	5209	9275	9028	7902		37462
PERF.	68	67	88	78	77		76
PREM.	8.87	7.70	31.81	26.53	22.03		96.96

Fig. 4—Premium posting sheet.

STANDARDS RECORD

PART NAME	Cr Tension Shaft	PRODUCT C & U	PART NO. 41.39-CM
OPERATION	3		MACH. Miller
DESCRIPTION	Mill Work		KIND Horizontal
			NUMBER
			MAT. 3½" Dia.
			S.A.E. C2
			CLASS I

SET UP	Std. Mins.	STANDARD MADE		
		Date	By	Approved
General	18 00			
Tools	29 90	2-17-40	C.T.P.	
Set Cut	5 00	CHANGED		
Misc.				
Per Job Total	52 90			

Time per Piece	First	Repeat
Place & Remove	1 50	1 20
Adjustments	70	70
Set Cuts		
Handling Total	2 20	1 90
Cutting Total	1 34	1 34
Per Piece Total	3 54	3 24

Special Tools
8" vise
vee blocks
9135 & 9136 side mills
4" X 1¼"

Machine Items	R.P.M.	Feed	Depth of Cut	Traverse of Tool	No. of Cuts	Norm. Time	Factor	Cutting Time	
Mill Work	91	3.50	3/8 x 2	3½"	1	1.34		1	34

First Piece	3.54
Repeat	3.24
Difference	.30
Set Up	52.90
Tot. Set Up Std.	53.0
Std. Mins. Per Pc.	3.2

Remarks

TOTAL CUTTING TIME

FIG. 1—Standards record. There is a standard record for each of the operations listed on the standard labor rate card shown in Fig. 2.

straighten out the difficulty without any revision. Such references to the standards department are expected and encouraged and are frequently made. They contribute to an important extent to the success of the system by gaining the confidence of the operators and eliminating any feeling of formal finality between workers and planners.

Several forms for the different records are kept in the standards department and in the machine shop departments. The standards record sheet, shown in Fig. 1, gives the whole story on which the incentive figures are based. This sheet remains in the standards department and from it the file of standard labor rate cards is made out in duplicate. There is a card for each part made in the shop and each department in the machine shop has a file for all the parts the department makes and the duplicates are kept in the standards department.

By this system the premium of each operator is figured daily by the accounting department and paid the following week with the regular wages. The way this is worked out is as follows: When an order comes into the shop, the foreman lays out the work with the help of the corresponding standard labor rate cards, Fig. 2. The clerk hands out the work to the operator, telling him the standard time and base rate per hour. The clerk also enters the time of giving out the job in his daily checking card, Fig. 3, of which there is one for each operator. The time when the job is finished, or the number of parts finished at the close of the day is also entered by the clerk.

These daily checking cards are turned in every day to the accounting department which calculates costs and premiums. It also makes

SET UP ELEMENTS — DETAIL OF TOOL LIST	STD. MINS.	PER PIECE ELEMENTS — DETAIL OF PLACE AND REMOVE	1ST. PC.	REPEAT
Arbor	3 00	Heavy	1 00	80
Cutters	8 00	Strap & bolt	50	40
Vise	10 00			
Trip Dog	40			
Spd. & Feed	50			
B/P	2 00			
Chain Falls	6 00	TOTAL	1 50	1 20
		DETAIL OF ADJUST.		
		Start & Stop	10	10
		Arm Table	20	20
		Raise & Lower	20	20
		Chips	20	20
TOTAL	29 90	TOTAL	70	70
DETAIL OF SET CUTS		DETAIL OF SET CUTS		
	5 00			
TOTAL				
DETAIL OF MISC.				
TOTAL		TOTAL		

NAME: Extension Shaft | RATE BASED ON: | PART NO: 4139-CM

MATL: 3 ½ dia C-2 | LABOR COST: | MATL. COST: | DWG. NO: 05

DEPT	OPERATION	MACHINE NO. OR CLASS	OPER. NO. ON DWG.	BASE R.P.M.	STAND. SET UP	STAND. PER PC.	MACH. CYCLE	PERCENT N. W. T.
6	J & L Turret		1	63	172m	36m		
6	"		2	63	103m	14.9m		
6	Hor. Mill		3	63	53m	3.2m		
6	"		4	63	68m	19.1m		
5	Sen. drill		8	60	21m	.9m		
3	Hdd. Stat. Gr.	60	16	63	60m	27.6m	CF	
3	Sand. Pl. Gr.	1120	17	63	41m	10.6m	CF	
							9-6-40	

FORM 5107 — STANDARD LABOR RATE CARD — GILMAN FANFOLD CORP.

FIG. 2—Standard labor rate card, made out in duplicate. The standards given in Fig. 1 are for operator No. 3.

up the posting sheet, Fig. 4, which is sent back to the shop every day so that the operators will know without delay with what premiums they are being credited. The posting sheet also provides a daily performance record whereby the foreman can find out who may be falling behind, enabling him to give assistance when and where needed before there is a serious falling off in production, or before the operator gets discouraged.

The posting sheet is then sent to the standards department. It provides the latter with a complete daily check-up of every man working on standards, and a means of showing what each man is doing. The column headed PERFORMANCE is a summing up and gives a quick idea of how the standards are working out. A rating of 60 is given if the work is done in normal, or standard time and is naturally raised as the standard time is bettered.

The performance of a whole department is the average of the individuals plus allowed time for waiting, re-work and other exigencies of production. This is shown in the weekly labor analysis, also made out by the accounting department, in the form of a separate sheet for each department in the machine shop. It covers all labor expense, both for work done on standard time and day time. The PERFORMANCE sheet is large enough for the performance records of 13 weeks, for comparison. This is, of course, important in order to be able to tell at a glance whether the performance is slackening or improving. Entries on one side of the double spread sheet represent time and those on the other side value in dollars.

These weekly labor analysis sheets provide a means of control and are studied carefully by the management. The foremen give particular attention to them. While these sheets are too large and elaborate for reproduction here it will be interesting to consider briefly a few of the more important items set forth on them, and which are given special study from the standpoint of control. One column is headed MINUTES TO EQUAL STANDARD TIME, which shows how much an operator falls behind standard time, keeping the department performance figure below 60.

Another important and informative part of the labor analysis shows the indirect hours and labor put into material handling, supervision, maintenance, etc. Standards have been figured which are reasonable for the conditions in each department, and any increase over such standards is represented in the column headed COST RATIO by the ratio of the standard to actual direct and indirect labor costs.

The bonus received by the foreman of each department and his assistants is also figured from entries on this sheet. That is, one of the entries is headed SUPERVISION PERFORMANCE, and is obtained by multiplying the PERFORMANCE of the department by the COST RATIO. When this is above 60 the foreman and his assistants get a bonus. A number of factors are taken into consideration in arriving at allowances for conditions over which the foremen have no control so that they will not be unjustly deprived of bonuses. For instance, one factor over which the foremen have no control and which is important in the calculations is the large amount of inexperienced help that has been employed. The effect of this shows very plainly in the departmental performance figures, and other records. If fair allowances were not made for this unavoidable condition, foremen and assistants in many if not all of the shop departments would not get a bonus, or even have a chance to get one for some time.

When performance figures in the labor analysis are low, especially if persistently so, and if the reason is not apparent, an investigation is made to find where the trouble lies. On the other hand, persistently high performance may also be worth investigating in order to find out why the work progresses so well, and if it may not be possible to introduce some innovation elsewhere which will produce correspondingly good results. In other words, the weekly labor analysis provides a very definite means of control which has proved of great value to the management. It is especially valuable at this time when so much pressure exists to improve production.

How to Choose A. C. A

• • • This article, printed in two parts, of which this is the first, should be read in conjunction with an earlier two-part article by the same author on "How to Choose D.C. Arc Welding Equipment" (THE IRON AGE, Aug. 7 and 14, 1941). The present discussion shows where a.c. equipment best fits into the production picture, and compares its performance with d.c. equipment. Attention is also called to design and safety features that should be watched for in selecting the proper equipment. Although the advantages cited seem to weigh in favor of a.c. apparatus, the source of information is unbiased, since Mr. Wyer's company manufactures both general types of welding machines.

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TO choose wisely the proper alternating-current arc welding equipment, the user should keep in mind the advantages he may obtain in many applications by using a.c. welding power in place of the more conventional d.c. welding power. These advantages are:

1. Faster welding.
2. Easier welding.
3. Better deposited metal.
4. Lower costs.

Assuming adequately designed, properly constructed equipment, its type will have little effect on the first three advantages, because these are to a large extent inherent in the a.c. welding process. But they can usually be obtained with a reduction in operating cost besides, when the equipment is correctly selected, and when a. c. is applicable to the product.

These four general types of a.c. arc welding equipment may be used:

1. Single-operator, static transformer type.
2. Static transformers and reactors in a multiple-operator system.
3. Frequency changer, or "rotating transformer" type.
4. Simple reactors on commercial power circuits.

Of the four classifications, the first has been applied in the great majority of a.c. welding installations for reasons of flexibility, simplicity and economy. Single-operator arc welding transformers are available in a wide range of ratings, and they are quiet and very easy to adjust, require little or no maintenance, and give remarkable economy in power consumption.

Classifying transformer sizes by application gives three major divisions:

For job shop and maintenance operations, 200-amp. and smaller units are generally used. They are not as easy to use as small d.c. sets, their principal advantages being low first cost and the fact that they do not require three-phase power supply.

In medium and heavy industry for manual and for machine welding, 300 and 500-amp. units are largely used. This is the field in which a.c. welding has the greatest opportunity to replace the d.c. process. (See Fig. 1)

Lastly, 750, 1000-amp. and larger ratings are used almost exclusively in heavy-current machine welding, notably by the Unionmelt process, where the outstanding economy of a.c. equipment is most apparent.

Selection

One of management's questions with regard to a.c. welding equipment is concerned with the prac-

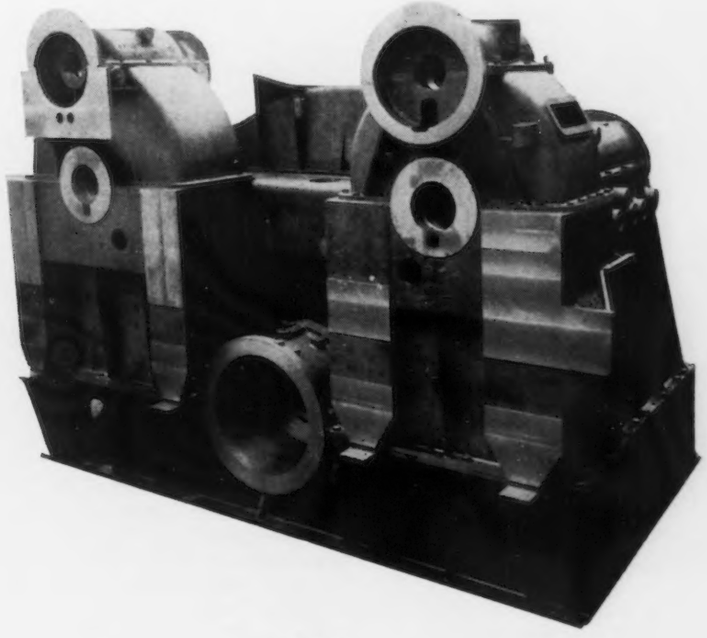
C. Arc Welding Equipment

ticability of the a.c. arc welding process. In the field of the 750-amp. and larger sizes, there is hardly room for doubt in view of its nearly complete capture of the field. In the range of 200-amp. and smaller sizes, the matter is largely one of compromise between usability and first cost; d.c. equipment will almost always give easier operation and wider applicability, but a.c. equipment is less expensive. While alternating current *can* be used in the majority of applications for light work, it does not show the same savings as in heavy work.

In the field of the 300 and 500-amp. sizes, the applicability of the a.c. process depends on the type of electrode material employed. Except in those jobs requiring special alloy electrodes, or those of the quality, penetration, and usability characteristics of A.W.S. Class E-6010 and E-7010, a.c. is almost universally applicable. Evidence of this is seen in the change-over from d.c. to a.c. of many large users, and in the recent purchases of lots of 10 to 100 a.c. units as nearly exclusive equipment for new set-ups devoted to high-quality welding on defense materials.

Other interests of management will be the durability and economy of the equipment selected. The first point need present no problem because responsible makers offer units that have been proved in years of manufacture and use, and because transformers are inherently durable by reason of their extreme simplicity. It is in connection with economy of operation that careful selection will pay the biggest dividends. While a.c. units in general are extraordinarily low in power consumption, maximum return on the investment can only be assured by insisting on analysis based on records and careful estimates of the welding load and other electrical plant load.

By R. F. WYER
Welding Engineer, General Electric Co., Schenectady



ABOVE

FIG. 2—On complicated work like this gear casing, a.c. arc welding gives speed and quality in addition to easy operation and power savings.

LEFT

FIG. 1—Shops like this find careful selection of a.c. arc welders particularly profitable because large amounts of welding power are involved.

Safety Considerations

The question of safety sometimes arises in connection with the selection of a.c. welding equipment, notably in hot weather. High humidity and dampness of operator's clothing enhances the possibility of noticeable electric shock from any arc welding equipment. However, all concerned should recognize the necessity for adequate safety practices among arc welders regardless of what type of equipment is used, and when such practices are insisted on, there remains little choice between equipments of reliable manufacturers from the safety point of view. In such units, open circuit voltages will usually run well below the 100-volt maximum established by N.E.M.A. standards, and will still be high enough to assure good arc stability and usability characteristics.

In the small transformer field, the question of open-circuit voltage should be investigated, because it involves both power factor (or kva. input) and usability. These units are small enough so that power factor correction is usually not justified, and it is therefore desirable to keep the uncorrected power factor to a reasonable figure. This may be

roughly approximated as the ratio of arc voltage to open circuit voltage. For example, a unit having an open circuit voltage of 90 and an operating arc voltage of 27 would have a power factor little better than 30 per cent.

While power factor and safety considerations point to the selection of low open circuit voltages, too low a value will result in hard starting and poor arc stability. How low this voltage may go depends to some extent on the work to be done and on the electrodes available. With constant improvement in inherent stability of good a.c. electrodes, the minimum open circuit voltage required for their successful operation may be decreased in the future. For the present, however, voltages of less than 65 volts should not be applied without recognizing the likelihood of difficulty in striking the arc, particularly in the lower range of welding currents.

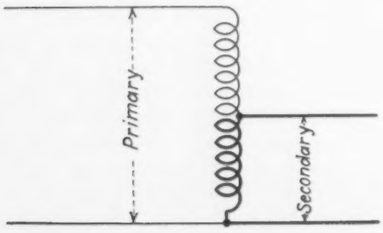


FIG. 3—Elementary diagram of an auto-transformer connection. This sort of an electrical device is uneconomical and unsafe for arc welding application.

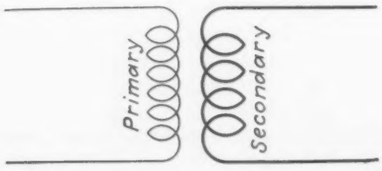


FIG. 4—Elementary diagram of an insulating transformer connection for a.c. arc welding.

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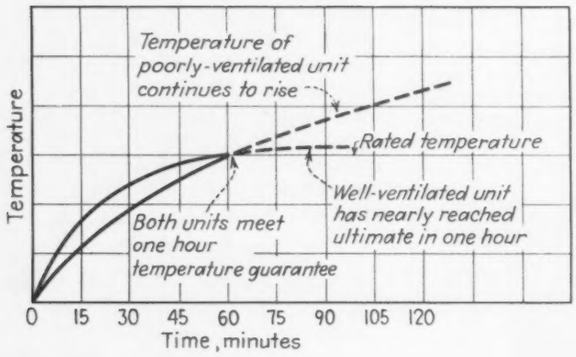

FIG. 5 — Typical temperature-time characteristics of well ventilated and poorly ventilated transformer type arc welders on the same working load.

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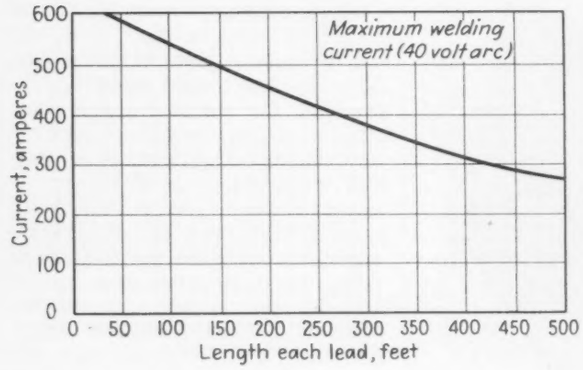

FIG. 6 — Curve showing effect of lead length on maximum output current of typical 500-amp. a.c. arc welder. Leads are taped together to keep reactance low; maximum currents will be less if leads are spaced from each other.

Method of Current Control

Another factor in the usability of small welding transformers is the method of current control. Continuous current control, giving an infinite number of current settings, together with an easily read current indicator, gives assurance of quick and correct current adjustment. Where switches or plugs are used, they should give enough settings to permit close current control, and should be clearly marked to avoid confusing the operator. Units have been marketed in which current steps as large as 30 amp. were provided on the theory that intermediate currents could be obtained by holding a longer or shorter arc. Such an arrangement is entirely impractical, as variations in arc length large enough to effect current adjustment would make it impossible to deposit good weld metal.

The actual rating of the unit should be checked in selecting a small arc welding transformer. Model numbers or type designations may be mistaken for the ampere rating of the unit. While an equipment having a *maximum output* of 250 amp. may be capable of carrying this load on a low-duty-factor manual welding application, it may not be even equivalent to another equipment *rated* 200 amp. capable of handling much higher duty factor loads.

Particularly in the small transformer field, construction and design must be considered in making a wise selection. Probably no other welding equipment market has been so flooded with inadequate welders on which service may be difficult or impossible to get. Specific points that should be checked are the current-adjusting means, the method of making internal connections, the kind and quality of insulation used, and the method of clamping cores and coils. Switches or plugs may be of inadequate capacity. Internal connections made with soft solder or stove bolts are likely to give trouble. Inferior insulation is a positive indication of short life, and lastly a design where core clamping forces are transmitted through materials which may shrink often results in noisy transformers.

No welder designed on the auto-transformer principle, illustrated schematically in Fig. 3, should be considered. With primary and secondary windings thus connected together, failure of the primary part by short-circuiting, or of the secondary part by open-circuiting, will place full line voltage on the electrode holder. With the accepted insulating-transformer connection of Fig. 4, the two windings are entirely separate electrically, and the hazard just mentioned is eliminated.

It is in the choice of 300 and 500-amp. ratings that careful analysis from the point of view of economy

of operation is very worth while. In these ratings, built-in power factor correction is available, by means of which the cost of power not only for the welding shop but for the remainder of the plant, may be reduced. Selection of these ratings can therefore be based to advantage on the electrical load conditions of the entire plant as well as on the characteristics of the welding power load, except where the latter is an insignificant part of the total.

For example, if the overall electrical power factor is low, and a high power factor penalty or high kva.-demand charge are included in the utility rate schedule, it may be desirable to install 500-amp. welding transformers, even though 300-amp. units could handle the welding current requirements. Because no-load losses are unusually low and efficiencies very high on the larger units, such a choice will not result in excessive energy consumption as does the operation of oversized d.c. single-operator arc welders.

Power savings which can be realized with a.c. welders in place of motor-generator sets can be divided into energy savings and demand charge or power factor penalty savings. Only the latter require very careful analysis because the saving in energy or kw.-hr. consumption is inherent in the operation of any well-built a.c. arc welder. On the other hand, the relationship of the welding load to the remaining plant load must be studied to obtain the most economical welder installation. The kva.-demand saving may run as high as 60 per cent of the total power saving.

Basically, the object is to so proportion the welder capacity to the welding load that the average net power-factor-corrective capacity of the welders will just balance out, or cancel, the lagging reactive kva. of the remaining plant load. For the lagging reactive kva. contributes only to the cost of power, and contributes nothing to the useful work that can be done with it.

In one instance, a manufacturer is operating 95 a.c. arc welders with a calculated yearly saving in overall plant power bills of $30,000 as compared with what the plant power would cost if d.c. motor-generator sets had been installed. Compared with a similar installation of ordinary a.c. welders without power factor correction, this saving amounts to $15,000. These figures take no account of additional savings over d.c. operation due to higher welding speeds, more uniform deposited metal, and lower equipment maintenance costs.

In calculating the proper size of corrected-power-factor a.c. welders, the following welding conditions must be estimated or measured.

1. Total number of arcs
2. Average amperes per arc
3. Average arc volts
4. Average shop duty factor (ratio of arc time to total time units are energized).

In addition, the average kw. and kva. load of the other plant equipment should be estimated. (The total plant load figures can be arrived at by working backward from the monthly power bills, using the applicable utility rate schedule.) From these figures, the average lagging reactive kva. and the leading kva. available to correct it, may be calculated with considerable accuracy. (See appendix at end of Part II of this article.)

FIG. 7—Positioning of this heavy assembly is justified by the increased speed and improved quality that can be obtained with a.c. welding in the flat position.

Usability and Durability

As to usability and durability, the comments made about 100 and 200-amp. units apply as well to 300 and 500-amp. equipments. Since

the duty factor is frequently higher for the larger ratings, the importance of long-lived insulation and adequate cooling is correspondingly increased. In this connection, it should be noted that units of equal one-hour ampere rating may differ noticeably in their ability to handle a heavy load of high duty factor. A transformer with particularly good heat-dissipating ability may reach its ultimate temperature (for a given load and duty factor) sooner than one with inferior cooling. This is true if the latter depends on the heat-storage capacity of heavy masses to delay its heating curve long enough to meet the requirements of a one-hour steady load rating test. Yet the adequately ventilated machine's heating curve will level off quickly, whereas the temperature of the other may ultimately rise much higher. This comparison is shown graphically in Fig. 5.

Another important point of difference between welders is their overload capacity. This involves not only their maximum available output, but the duty factor at which they can deliver it, as pointed out in the preceding paragraph. A unit which will barely deliver its rated current when set for maximum output has no overload capacity. However, even high maximum output does not guarantee ability to take care of heavy jobs unless the welder can also stand high-duty factors.

750 Amp. and Larger Units

The selection of large units is relatively simple because they are used almost exclusively for machine welding. In such applications, the average all-day duty factor may be of no importance because of the long periods of time during which they are continuously loaded. For example, a unit loaded for two hours and idle for one hour has an all-day duty factor of only 67 per cent. Yet, from the standpoint of heating, the two-hour load should be regarded as a continuous load and the load should therefore not exceed approximately 80 per cent of the one-hour rating.

As in the case of other ratings, attention should be paid to design details as they may affect durability, usability, adequate ventilation, and noise.

Duty Factor

Duty factor is defined as the ratio of actual arc time to the total time during which units are energized. From the point of view of welding capacity alone, best economy can be obtained by selecting welder ratings on a duty cycle basis. As in the case of d.c. machines, adequately designed transformers can be used all day in manual welding duty at average loads ranging from as high as 90 per cent of their one-hour rating to their maximum output. Assuming well ventilated transformers, the permissible upper limit of average load can be approximated by dividing the square root of the average duty factor into the continuous capacity, the latter being about 80 per cent of the one-hour rating. For example, a 500-amp. unit operating on a 50 per cent duty factor could be loaded to:

$$\frac{0.8 \times 500}{\sqrt{.50}} = 560 \text{ amp., approximately}$$

Conversely, the permissible duty factor at a given load can be approximated by squaring the ratio of eight-tenths of the one-hour rating to the desired load current. Assuming a 600-amp. load, the permissible duty factor would be:

$$\left(\frac{0.8 \times 500}{600}\right)^2 = 44 \text{ per cent, approximately}$$

Care must be taken in making the calculations above that a load current arrived at does not exceed the maximum output of the unit.

The tabulation below shows the relationship between the duty factor and the welding current which can safely be drawn in normal manual welding all day from a typical, well-ventilated 500-amp a.c. welder.

Manual Welding Duty Factor, Per Cent	Maximum Usable Current, Amp.
20	600
40	600
60	510
80	440

Lead Length

Long leads do not affect the welding performance of an a.c. welder in any way. With alternating current, the effect of lead reactance is added to that of lead resistance in cutting down the current which will flow *at a given setting* of the unit.

It may therefore be necessary to raise the current setting of the welder to get the desired current, but this does not add to the heating of the machine, as it does in the motor of a motor-generator arc welder. It is impossible to overheat an arc welding transformer by operating it with excessively long leads.

The only noticeable effect of extra long leads is in limiting the maximum output of the welding transformer. If the welder is designed with little or no output margin, it may be found impossible to secure rated ampere output with normal arc voltages. It is therefore advisable to check this point if the use of long leads is anticipated. Fig. 6 shows the maximum output available from one design of 500-amp. welder, plotted against the distance between the arc and the transformer.

(To be concluded)

Russian Standardized Steel Production

THE first results of the working of the standardized No. 5 open hearth furnace* at the Russian Azovstal Works are discussed by A. Bulavkin and V. Kiselev in a recent issue of *Stal.* Data obtained from the first 50 heats in this tilting open hearth are briefly summarized. The furnace, with a hearth area of 6943.69 sq. ft. designed to take charges of 400 to 500 tons, is fired with a mixture of coke oven and blast furnace gases.

The charges in the heats investigated were made up of molten pig iron, 50 to 60 per cent of the weight of the metallic charge, the remainder being scrap; iron ore, 8 to 16 per cent; manganese ore, 2 to 3 per cent; and limestone, 6 to 8 per cent. The pig iron was added 1 to 1½ hr. after the solid portions of the charge had been added.

Observations made suggest the desirability of increasing the heat supply to the furnace to accelerate the heating up during charging and the rate of carbon elimination. The limestone should be replaced by lime, and 1 to 1.5 per cent of bauxite should be added to improve the fluidity of the slag.

**Results of investigations on standardized Russian blast furnaces were reported in* THE IRON AGE, *Sept. 11, 1941.*

Chrome Magnesite Open Hearth Linings

IN report No. 368 of the steelworks committee of the Verein Deutscher Eisenhuttenleute, published in *Stahl und Eisen* and translated in *The Iron and Coal Trades Review*, London, A. Mund discusses the greater durability and production that can be realized by using chrome magnesite in place of silica brick as a furnace lining, in open hearth furnaces heated with coke oven gas.

In Germany chrome magnesite linings have become very popular since silica linings do not stand up well to the high temperatures required for the production of high alloy chrome steels and chrome nickel steels with more than 2 per cent chromium. Furthermore, greater proportions of high alloy scrap are now melted down, necessitating a high furnace heat yielding an extremely inert high chromium slag that throws back a considerable part of the heat towards the furnace roof. Subsequent additions of alloys to the bath cause an intensive reflection of heat against the roof, and the exposure to heat of the silica roof is so severe that it cannot stand such conditions for any extended period of time.

The first furnace lined with chrome magnesite, mentioned by the author, had the whole of the upper part lined to a depth of 11.41 in., with Iadex E blocks, the lower part of the furnace being unaltered, thus affording a direct comparison of silica and magnesite roofs. After 3400 hr., or 500 heats, the chrome magnesite roof was still 4.33 in. thick, the same thickness being reached with the silica roof after about 290 heats. After 670 heats the chrome magnesite roof had been reduced to a thickness of 1.97 in., and it was then built up again to 5.12 in. At this point the magnesite roof had been in use for 270 heats or 1800 hr. more than the silica roof.

Thermal insulation was much greater with the chrome magnesite lining than with the silica lining, there being a considerable reduction in heat consumption with the former with the thickness of the linings being the same. At a thickness of 3.54 in., the saving was 0.18 10^6 thermal units per ton, corresponding to 1553.8 cu. ft. of gas per ton of steel produced. The initial gas consumption with the magnesite lining in all cases was between 35 and 53 cu. ft. per ton of steel less than with the silica lining. Observations made after the 940 heats indicated that the checker chamber was still in fairly good condition and after 495 heats of 3300 working hr. the flues under the roof bricks were cleaned and the checker chambers fused out to reduce heat losses in the checkerwork. After 650 heats or 4350 working hr., the flue temperature for the first time reached 1202 deg. F., the draft still being around 0.197 in. water gage. This Radex lined furnace was in operation for 43 weeks or 6440 hr., with a total output of 49,300 tons of steel or 7.65 tons per hr. The chrome magnesite lining gave complete satisfaction and using a high proportion of chromium scrap, high temperatures could be maintained intermittently without affecting the furnace.

To get an idea of how much heat could be saved with a magnesite lining, four campaigns were run with the same furnace but with different linings. A short campaign without intermediate repair of the silica lining showed serious wear after 267 heats. With two intermediate repairs in the second campaign, the silica lined furnace took 438 heats. At the start of the second campaign the checked chambers had already run 100 heats and after 60 more heats they had to be cleaned again as coal dust was used in the amount of 2645 lb. per hr. After 250 heats the checkers were again choked with dust and the silica roof had to be repaired. In the third and last campaign before the silica was replaced by chrome magnesite, the furnace was run for 4288 hr. without interruption and handled 590 heats. On changing over to magnesite, it was confirmed that the heat consumption with this lining rises more slowly with the number of heats than is the case with the silica lining. At the end of 590 heats in the third campaign, the difference was 0.34 10^6 thermal units per ton, that is 2931 cu. ft. of gas per ton of steel, or a difference of 21 per cent.

Taking the longest silica campaign and the magnesite campaign, the respective initial outputs were 7.4 and 8.4 tons per hr., the latter figure rising steadily to 8.5 tons per hr. after 1000 hr. or 150 heats. After 3000 hr. or 450 heats, the magnesite lining had an output of 8 tons per hr. and the silica lining produced 7.4 tons per hr. After 3700 hr., or 550 heats, the corresponding values were 7.7 and 7 tons per hr. The output of the magnesite lining continued to drop slowly to 7.6 tons per hr. after 5000 hr. or 750 heats and then steeply to 6.8 tons after 5400 hr. The furnace was then cleaned and the output immediately increased to 7.8 tons per hr. at 6000 hr. or 900 heats. The silica campaign finished after 4000 hr. or 600 heats.

Owing to the thermal properties of the magnesite bricks and the reduced heat requirements of a furnace lined with them, there is a marked reduction in the volume of air required for combustion as well as in the volume of flue gases.

It was calculated that over a period of 4288 hr. the heat saved with the magnesite lining was about 17.4 per cent more than with the silica lining, with the increase in furnace output was 6.6 per cent. Fuel costs were reduced about 16.8 per cent. Compared with a silica campaign when raw materials supplies were still satisfactory, the heat economy was 12.5 per cent and the increase in output 1.65 per cent. During 550 heats corresponding to 28,000 tons of steel produced, the extra costs of the chrome magnesite lining were found to be offset by the reduction in fuel costs alone, and in addition there was still increased output and a saving in repairs. Silica linings were repaired after every 600 to 650 heats while magnesite linings lasted about 900 heats. Silica campaigns, interrupted for four weeks for repairs, produced 43,000 tons of steel while magnesite campaigns, with no interruptions, turned out 48,000 tons of steel. The added 5000 tons output represented an increased output with the same furnace plant and over the same period of time.

SAMPLES of cold headed products, all of which can be produced also on the screw machine. Dimensions of all these parts are given in accompanying drawings.

Cold Header c

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. . . Cold heading is far more versatile than is generally realized. It can today lead to faster and more economical production of quite complex parts.

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AMONG the most rapid and useful machines for working steel known to the metal working industry are the automatic screw machine and the cold header. Both types of machine are of great importance in munitions production. Both can produce parts so nearly identical as to shape and dimensions that they are most difficult to tell apart. The screw machine is much the more versatile as well as more widely distributed or more generally available. It can be used with almost any bar stock capable of being machined but is most commonly employed with stock suited for easy and rapid machining. It depends, however, upon cutting metal away, which is often a rather slow as well as a wasteful process from the standpoint of metal economy, even though the waste is frequently justified by results in other directions.

As against this, the cold header is less versatile and less widely available, but it is exceedingly rapid and highly economical in metal, as loss in scrap is slight. It usually depends upon other machines for finishing operations, as, indeed, the screw machine does also though perhaps to a lesser degree. But, in general, it can be made to work within the same dimensional limits. Materials used by the cold header must possess adequate ductility, but the range of materials usable is fairly wide and the materials preferred are no more specialized than are those preferred for the screw machine.

Although the screw machine is employed to turn out uncounted numbers of screws and some bolts, a large proportion of these are of a size or in a material not suited for cold heading or are required in quantities too small to justify the cost of tools for cold heading. In other words, the cold header gets a greatly preponderant share of the screw and bolt business in types requiring long runs, its great economy of material being a large factor in this business, as is also the rapid production. A similar, though not identical condition, applies in the case of other long-run parts which can be made by either method. It might become identical if engineers and purchasing agents were more generally aware of the character of work the cold header can perform or if they were better acquainted with the economies of cold heading.

It happens that the metalworking industry is in, or rapidly approaching, a position where it is faced with a shortage of a wide range of materials, including many grades of steel, brass and other materials extensively worked by the screw machine and by the cold header. Economy in these materials is of great importance to all. It is also true that the demand for screw machines is at, or close to, an all-time high and that makers of screw machine products generally are avoiding new business because of the inability to take care of regular customers and such new ones as they are committed to serve. Although the makers of cold headed products are in a similar position in respect to some of their equipment, some at least still have added capacity for production and some can increase this capacity if it appears wise to do so.

With this in mind, the author gained the cooperation of experienced men of the Lamson & Sessions Co., large producers of cold headed products, to gather examples of cold headed parts known to have been produced at lower costs than if made on the screw machine. It is believed that examination of these specific examples is likely to point the way to economies in

r or Screw Machine?

By HERBERT CHASE

metal and in time, perhaps, help to relieve some of the pressing demands which producers of screw machine products cannot meet.

Before going into details, however, the matter of relative tooling costs deserves brief discussion, and some mention needs to be made about the way in which cold headers operate and what they can and cannot do. Although the cold header must be equipped with a die, stock dies are available for many parts and many of these could be put to work where designing for the use of their product can be done or existing designs of potentional customers are slightly altered. Moreover, the dies commonly used are moderate in cost, as most of the machining is simple and rapidly done. As against this, the screw machine can often use stock tools although the much used forming cutters and some other tools, as well as cans, have to be made special for many jobs. In some cases, the screw machine tooling may cost as much as the tools for cold heading. In any event, tooling costs for the screw machine are seldom negligible and should be set off against those for the cold header in making comparisons.

Cold heading is done with "wire," the equivalent of rod stock except that it comes in long coiled lengths which are run through a straightening device on the way into the header. The latter is a cold forging machine which strikes the stock one, two or three blows, depending upon the type of machine and dies used. Each blow either upsets or heads a part of the piece or else decreases its size by extrusion, that is, by driving it into a hole smaller than the diameter of the shank or the wire being headed. In other words, the metal is flowed rather than cut. Such operations as threading, tapping, pointing, slotting and drilling have to be done on secondary machines, even sometimes in screw machines, then used as chucking machines, although such use is not frequently needed. Some cold headers, called "bolt makers" have heading, trimming, pointing and threading stations into which the bolt is transferred automatically, but the number of such machines in use is limited.

Threads required on cold headed products are nearly always rolled

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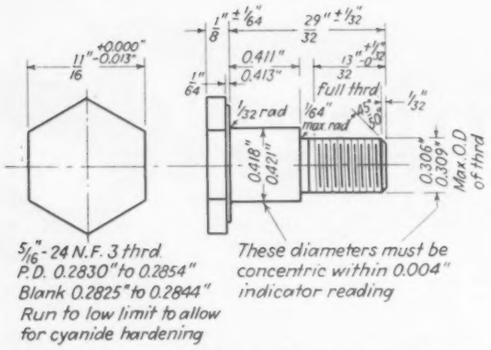


Fig. 1—This cold headed shoulder bolt costs 50 per cent less than if made on a screw machine. It is made of SAE 1020 steel.

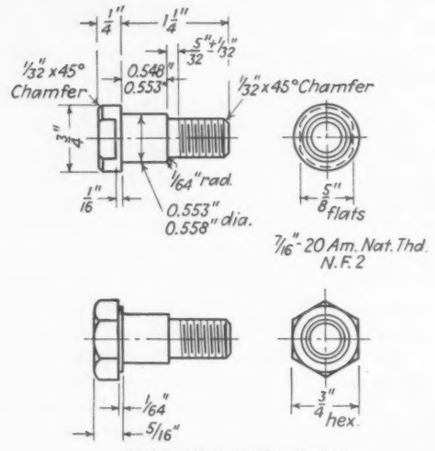


Fig. 2—Optional designs of shoulder bolts for cold heading or screw machine production. Steel used is SAE 1010, 1112 or X1112.

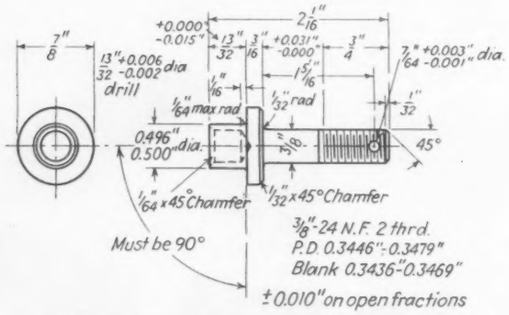


Fig. 3—Cold headed bolt with special drilled head. Steel used is SAE 1020.

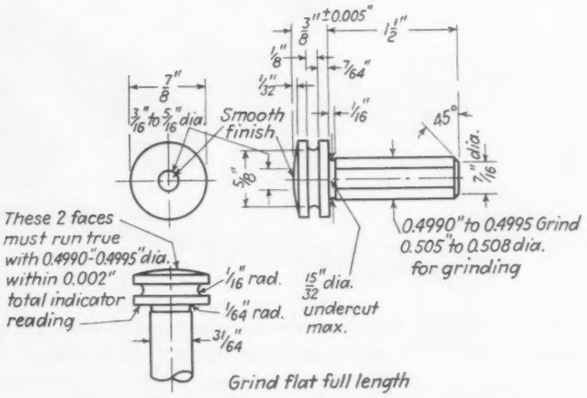


Fig. 4—This part is headed, but the grooves in and below the head are turned. Steel used is SAE 4140.

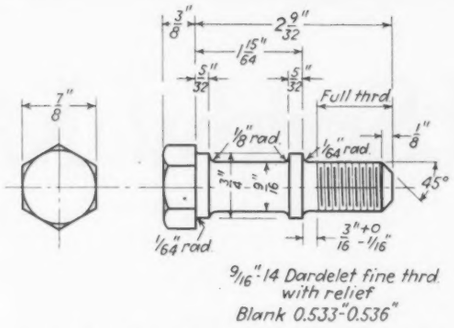
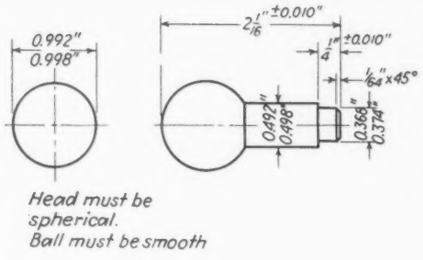


Fig. 5—Special headed bolt in which the necked portion is turned. Steel used is SAE 1035.



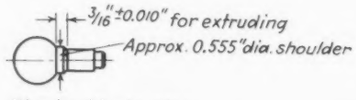


Fig. 6—Ball stud headed as in small sketch and subsequently shaved. Steel used is SAE 1020.

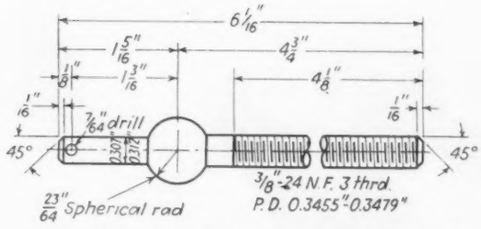


Fig. 7—The ball on this rod is produced by heading, and short end is extruded.

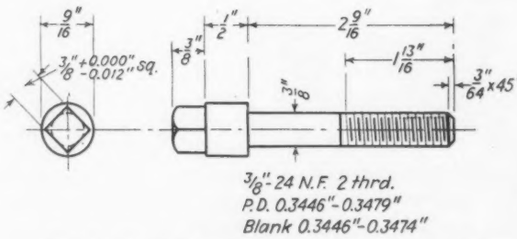


Fig. 8—Headed product with small end extruded and square broached.

threads. These are said to be both stronger and smoother than cut threads, although opinions differ somewhat on these points. In any event, class three fits, regarded as difficult when cut on the screw machine, are produced by rolling, and exacting aircraft specifications are met. Thread rolling is often done, of course, on screw machine products, occasionally in the screw machine itself. Several other secondary operations usually are required on cold headed products, some of them being needed also if the basic product is manufactured on the screw machine.

Illustrated in Fig. 1 is a cold headed product typical of many rather conventional shoulder screws. It is produced completely in the header except for reducing the diameter for the thread. The cost, however, including the secondary operations, is about 50 per cent less than if produced by the screw machine, chiefly because of the saving in stock. Dimensions are readily held and the 5/16-24 N.F. thread is a No. 3 fit.

Another shoulder screw is shown, in Fig. 2, chiefly because the purchaser is aware that it can be made either by cold heading or on the screw machine and permits alternative constructions as to the head and also allows three options as to the steel which may be used. SAE 1010 steel is suitable for cold heading, whereas SAE 1112 and X1112 are good screw machine stocks. The hex head design can be made complete, using hex stock, on the screw machine, but if the round head with flats were to be made on the screw machine, a separate milling (or equivalent operation) to form flats would be necessary. Either form can be cold headed—and probably much more cheaply—chiefly because of the saving in stock but also because of saving a trimming operation.

The special bolt, Fig. 3, originally made with radial serrations or knurling on the side of the flange away from the threaded end might be regarded as a "natural" for the screw machine, partly because the projection next to the flange has to be drilled out, whatever method of construction is used. This operation would be done as one of those on the screw machine but separately on a cold headed part. The latter also requires a separate shaving operation on the flange. Cross-drilling is often done on stock transfer attachments used with screw machines, but is a separate operation on the cold headed part. Despite these considerations, the cold headed part is reported about 50 per cent cheaper than the screw machine product, partly because of the great saving in steel, as 3/8-in. wire does the trick in cold heading whereas 7/8-in. bar is needed for the screw machine product. Radial knurling is done as a part of the cold heading; it is not a separate operation and does not require a knurling tool, as the serrations are made in the die and are duplicated on each piece.

Although the piece with a circumferentially grooved head, shown in Fig. 4, requires finishing all over after cold heading, it has proved to be about one-third cheaper in that form than when made on the screw machine because of more rapid production and saving in stock, which is optionally SAE 3135, 3140 or 2340 nickel bearing steels. However produced, the stem and the flat thereon have to be ground to hold the close limits specified. The grooves in the head and under it cannot be formed by cold heading, but are cut subsequently at the same time that the rest of the head is shaved. Such operations are done at high speed in an automatic shaving machine.

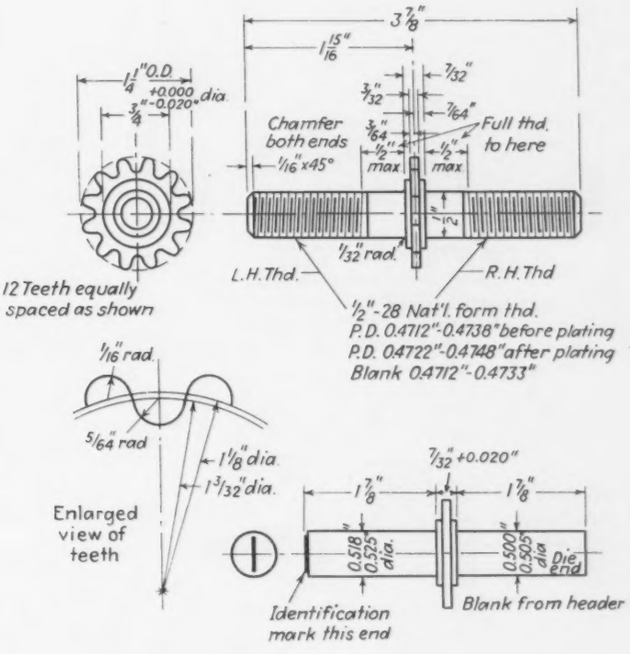
Parts, such as that in Fig. 5, which require a necked portion are not produced entirely by cold heading, but the blank is so produced and the neck is cut subsequently in a shaver which, at the same time, reduces the diameter on which the Dardelet thread is rolled subsequently. A piece of this shape is cold headed with a 3/4-in. diameter shank, using 3/4-in. stock on which the hex head is upset. There is some scrap in the shaving operations, but much less than if the piece were machined from 7/8-in. hex stock, such as would be required for the screw machine, and the cost is about 20 per cent less than for production by screw machine.

Products having heads forming a nearly complete sphere, as in Fig. 6, are often produced on the screw machine but can be made more cheaply by cold heading. That shown is 35 to 40 per cent lower in cost. In this case, the piece is made from stock of 0.555-in. diameter, as shown in the lower view, after which the shank is extruded to specified diameter, but leaving a shoulder of the stock diameter. The head, of course, is upset by the heading operation. Subsequently,

o o o

FIG. 9—Brake adjusting part with flange headed at center. Serrations trimmed later.

o o o



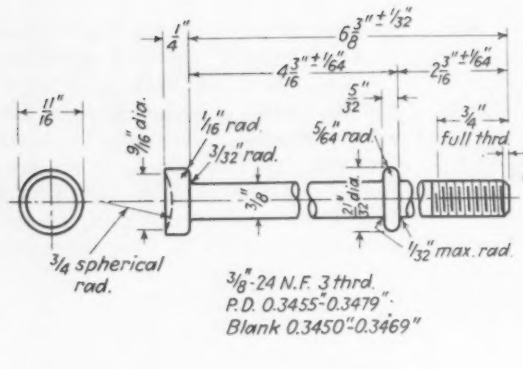


FIG. 10 — Part produced by heading and then reheading to form flange.

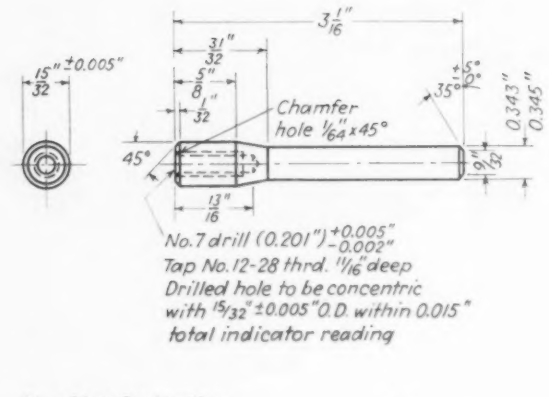


FIG. 11 — A simple headed part in which the hole is afterward drilled and tapped.

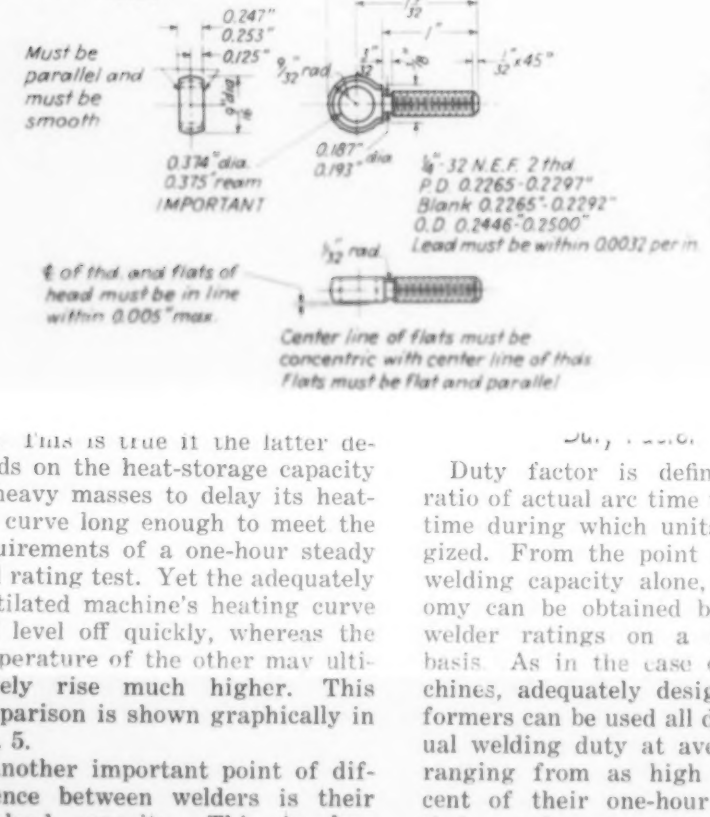


FIG. 12 — Headed eye bolt for aircraft applications. Steel used is No. 410 stainless.

the piece is chucked on the extruded diameter in the collet of a shaving machine fitted with a forming tools which cuts away the shoulder and shaves the spherical surface.

A piece such as that shown in Fig. 7 is produced by heading from wire of approximately the pitch diameter of the long thread. In this case, the shank at the other side of the ball is, initially, of stock diameter and the ball is headed in the position shown. The short shank is then reduced to specified diameter by a separate extrusion. Pointing (chamfering) of the ends and cross drilling require separate operations, as does the shaving of the ball surface. Nevertheless, there is a marked saving in cost over screw machine production, as the latter would require the use of stock at least 23/64-in. diameter with relatively slow removal of much wasted material.

In producing the piece shown in Fig. 8, 3/8-in. wire is used and the head upset is a cylinder 9/16 in. in diameter and 7/8 in. long. As the thread is rolled, it is necessary to reduce the diameter on which it is made, so that after the operation, the crest diameter will be the same as the diameter of the stock. Reduction in diameter for rolling is done by extrusion. The square head is broached. Cost is somewhat below that for the screw machine equivalent, as that too would require either broaching or milling the head square in a secondary operation and more stock would be needed.

About 50 per cent reduction in

ing. This is true if the latter depends on the heat-storage capacity of heavy masses to delay its heating curve long enough to meet the requirements of a one-hour steady load rating test. Yet the adequately ventilated machine's heating curve will level off quickly, whereas the temperature of the other may ultimately rise much higher. This comparison is shown graphically in Fig. 5.

Another important point of difference between welders is their overload capacity. This involves not only their maximum available output, but the duty factor at which they can deliver it, as pointed out in the preceding paragraph. A unit which will barely deliver its rated current when set for maximum output has no overload capacity. However, even high maximum output does not guarantee ability to take care of heavy jobs unless the welder can also stand high-duty factors.

750 Amp. and Larger Units

The selection of large units is relatively simple because they are used almost exclusively for machine welding. In such applications, the average all-day duty factor may be of no importance because of the long periods of time during which they are continuously loaded. For example, a unit loaded for two

Duty factor is defined as the ratio of actual arc time to the total time during which units are energized. From the point of view of welding capacity alone, best economy can be obtained by selecting welder ratings on a duty cycle basis. As in the case of d.c. machines, adequately designed transformers can be used all day in manual welding duty at average loads ranging from as high as 90 per cent of their one-hour rating to their maximum output. Assuming well ventilated transformers, the permissible upper limit of average load can be approximated by dividing the square root of the average duty factor into the continuous capacity, the latter being about 80 per cent of the one-hour rating. For example, a 500-amp. unit operating on a 50 per cent duty factor could be loaded to:

$$\frac{0.8 \times 500}{\sqrt{.50}} = 560 \text{ amp., approximately}$$

Conversely, the permissible duty factor at a given load can be approximated by squaring the ratio of eight-tenths of the one-hour rating to the desired load current. Assuming a 600-amp. load, the permissible duty factor would be:

$$\left(\frac{0.8 \times 500}{600}\right)^2 = 44 \text{ per cent, approximately}$$

60	510
80	440

Lead Length

Long leads do not affect the welding performance of an a.c. welder in any way. With alternating current, the effect of lead reactance is added to that of lead resistance in cutting down the current which will flow *at a given setting* of the unit.

It may therefore be necessary to raise the current setting of the welder to get the desired current, but this does not add to the heating of the machine, as it does in the motor of a motor-generator arc welder. It is impossible to overheat an arc welding transformer by operating it with excessively long leads.

The only noticeable effect of extra long leads is in limiting the maximum output of the welding transformer. If the welder is designed with little or no output margin, it may be found impossible to secure rated ampere output with normal arc voltages. It is therefore advisable to check this point if the use of long leads is anticipated. Fig. 6 shows the maximum output available from one design of 500-amp. welder, plotted against the distance between the arc and the transformer.

(To be concluded)

Russian Standardized Steel Production

THE first results of the working of the standardized No. 5 open hearth furnace* at the Russian Azovstal Works are discussed by A. Bulavkin and V. Kiselev in a recent issue of *Stal.* Data obtained from the first 50 heats in this tilting open hearth are briefly summarized. The furnace, with a hearth area of 6943.69 sq. ft. designed to take charges of 400 to 500 tons, is fired with a mixture of coke oven and blast furnace gases.

The charges in the heats investigated were made up of molten pig iron, 50 to 60 per cent of the weight of the metallic charge, the remainder being scrap; iron ore, 8 to 16 per cent; manganese ore, 2 to 3 per cent; and limestone, 6 to 8 per cent. The pig iron was added 1 to 1½ hr. after the solid portions of the charge had been added.

Observations made suggest the desirability of increasing the heat supply to the furnace to accelerate the heating up during charging and the rate of carbon elimination. The limestone should be replaced by lime, and 1 to 1.5 per cent of bauxite should be added to improve the fluidity of the slag.

**Results of investigations on standardized Russian blast furnaces were reported in* THE IRON AGE, *Sept. 11, 1941.*

that in Fig. 10, are not commonly produced complete by cold heading, it is feasible to do so economically by the following means: Stock of ⅜-in. diameter is upset to form, in a single blow, the head of the piece, including the recessed spherical surface, leaving a long shank of stock diameter. Blanks thus made are reheaded at the other end to form a flange of 21/32-in. diameter, rounded as shown. This is done in a semi-automatic open die header and at the same time the end is extruded to the diameter for rolling the ⅜-24 thread which is made to No. 3 tolerances. This is an aircraft part and is made from SAE 1020 steel. To produce it by screw machine would require the use of stock at least 11/16 in. in diameter and result in much waste of material and about 75 per cent higher cost.

A part such as is illustrated in Fig. 11 is simply produced without a great waste of material in the screw machine, yet reports show a 50 per cent saving by production in a header from stock 0.460 in. in diameter. There is only slight upsetting of the large end and the shank is reduced in diameter by a double extrusion. Drilling, tapping and chamfering the end are secondary operations.

An eye bolt of the design in Fig. 12, when made by cold heading, costs about half as much as for screw machine production, even though, as on the screw machine, the head is formed in spherical shape, the flats are milled and the cross hole is drilled and reamed in secondary operations. The neck sphere is upset to form the eye. This portion is subsequently flattened in a press to give the specified thickness of the area around the hole, which is later drilled. The drilling and the slotting are secondary operations, as they would be in a screw machine product, which would have to be made from stock of about twice the diameter used for heading and would involve a high scrap loss as well as slow production.

Nuts for special purposes have a lip at the top to be spun over and thus fasten the nut in a square hole in sheet metal. Many other special shapes of nuts are produced, some of them not capable of duplication in the screw machine. Flanged nuts are readily cold headed. Production is rapid and economy in metal is high.

Although the foregoing may appear to put the screw machine product in an unfavorable light, its utility is too amply demonstrated to be open to question for an exceedingly wide range of parts. The screw machine can, of course, produce many parts which cannot be reproduced by cold heading. Many which can be cold headed in blank

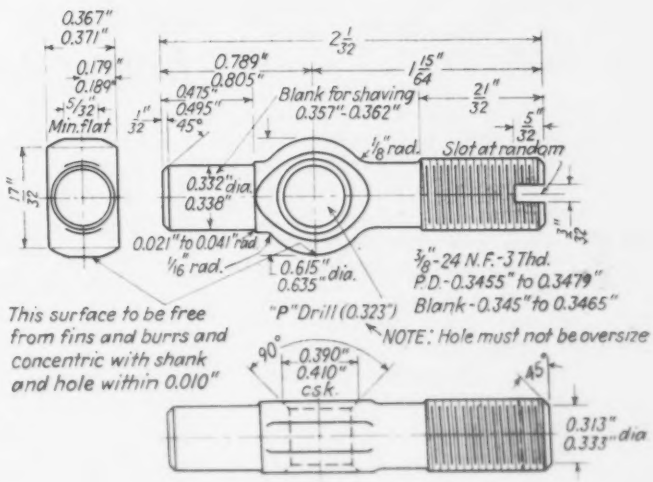


FIG. 14 — Headed product with eye formed near the center and later flattened in a press.

Space limitations do not permit going into details as to cold headed parts having heads of odd shape, some of them non-symmetrical in reference to the axis of the shank. One illustration shows several such parts, some of which cannot be produced at all on the screw ma-

translated in *The Iron and Coal Trades Review*, London, A. Hund discusses the greater durability and production that can be realized by using chrome magnesite in place of silica brick as a furnace lining, in open hearth furnaces heated with coke oven gas.

In Germany chrome magnesite linings have become very popular since silica linings do not stand up well to the high temperatures required for the production of high alloy chrome steels and chrome nickel steels with more than 2 per cent chromium. Furthermore, greater proportions of high alloy scrap are now melted down, necessitating a high furnace heat yielding an extremely inert high chromium slag that throws back a considerable part of the heat towards the furnace roof. Subsequent additions of alloys to the bath cause an intensive reflection of heat against the roof, and the exposure to heat of the silica roof is so severe that it cannot stand such conditions for any extended period of time.

The first furnace lined with chrome magnesite, mentioned by the author, had the whole of the upper part lined to a depth of 11.41 in., with Iadex E blocks, the lower part of the furnace being unaltered, thus affording a direct comparison of silica and magnesite roofs. After 3400 hr., or 500 heats, the chrome magnesite roof was still 4.33 in. thick, the same thickness being reached with the silica roof after about 290 heats. After 670 heats the chrome magnesite roof had been reduced to a thickness of 1.97 in., and it was then built up again to 5.12 in. At this point the magnesite roof had been in use for 270 heats or 1800 hr. more than the silica roof.

Thermal insulation was much greater with the chrome magnesite lining than with the silica lining, there being a considerable reduction in heat consumption with the

sponding to 1,553.8 cu. ft. of gas per ton of steel produced. The initial gas consumption with the magnesite lining in all cases was between 35 and 53 cu. ft. per ton of steel less than with the silica lining. Observations made after the 940 heats indicated that the checker chamber was still in fairly good condition and after 495 heats of 3300 working hr. the flues under the roof bricks were cleaned and the checker chambers fused out to reduce heat losses in the checkerwork. After 650 heats or 4350 working hr., the flue temperature for the first time reached 1202 deg. F., the draft still being around 0.197 in. water gage. This Radex lined furnace was in operation for 43 weeks or 6440 hr., with a total output of 49,300 tons of steel or 7.65 tons per hr. The chrome magnesite lining gave complete satisfaction and using a high proportion of chromium scrap, high temperatures could be maintained intermittently without affecting the furnace.

To get an idea of how much heat could be saved with a magnesite lining, four campaigns were run with the same furnace but with different linings. A short campaign without intermediate repair of the silica lining showed serious wear after 267 heats. With two intermediate repairs in the second campaign, the silica lined furnace took 438 heats. At the start of the second campaign the checked chambers had already run 100 heats and after 60 more heats they had to be cleaned again as coal dust was used in the amount of 2645 lb. per hr. After 250 heats the checkers were again choked with dust and the silica roof had to be repaired. In the third and last campaign before the silica was replaced by chrome magnesite, the furnace was run for 4288 hr. without interruption and handled 590 heats. On changing over to magnesite, it was confirmed

pc. after 900 hr. or 150 heats. After 3300 hr. or 450 heats, the magnesite lining had an output of 8 tons per hr. and the silica lining produced 7.4 tons per hr. After 3700 hr., or 550 heats, the corresponding values were 7.7 and 7 tons per hr. The output of the magnesite lining continued to drop slowly to 7.6 tons per hr. after 5000 hr. or 750 heats and then steeply to 6.8 tons after 5400 hr. The furnace was then cleaned and the output immediately increased to 7.8 tons per hr. at 6000 hr. or 900 heats. The silica campaign finished after 4000 hr. or 600 heats.

Owing to the thermal properties of the magnesite bricks and the reduced heat requirements of a furnace lined with them, there is a marked reduction in the volume of air required for combustion as well as in the volume of flue gases.

It was calculated that over a period of 4288 hr. the heat saved with the magnesite lining was about 17.4 per cent more than with the silica lining, with the increase in furnace output was 6.6 per cent. Fuel costs were reduced about 16.8 per cent. Compared with a silica campaign when raw materials supplies were still satisfactory, the heat economy was 12.5 per cent and the increase in output 1.65 per cent. During 550 heats corresponding to 28,000 tons of steel produced, the extra costs of the chrome magnesite lining were found to be offset by the reduction in fuel costs alone, and in addition there was still increased output and a saving in repairs. Silica linings were repaired after every 600 to 650 heats while magnesite linings lasted about 900 heats. Silica campaigns, interrupted for four weeks for repairs, produced 43,000 tons of steel while magnesite campaigns, with no interruptions, turned out 48,000 tons of steel. The added 5000 tons output represented an increased output with the same furnace plant and over the same period of time.

SAMPLES of cold headed products, all of which can be produced also on the screw machine. Dimensions of all these parts are given in accompanying drawings.

Cold Header o

o o o

... Cold heading is far more versatile than is generally realized. It can today lead to faster and more economical production of quite complex parts.

o o o

o o o

AMONG the most rapid and useful machines for working steel known to the metal working industry are the automatic screw machine and the cold header. Both types of machine are of great importance in munitions production. Both can produce parts so nearly identical as to shape and dimensions that they are most difficult to tell apart. The screw machine is much the more versatile as well as more widely distributed or more generally available. It can be used with almost any bar stock capable of being machined but is most commonly employed with stock suited for easy and rapid machining. It depends, however, upon cutting metal away, which is often a rather slow as well as a wasteful process from the standpoint of metal economy, even though the waste is frequently justified by results in other directions.

As against this, the cold header is less versatile and less widely available, but it is exceedingly rapid and highly economical in metal, as loss in scrap is slight. It usually depends upon other machines for finishing operations, as, indeed, the screw machine does also though perhaps to a lesser degree. But, in general, it can be made to work within the same dimensional limits. Materials used by the cold header must possess adequate ductility, but the range of materials usable is fairly wide and the materials preferred are no more specialized than are those preferred for the screw machine.

Although the screw machine is employed to turn out uncounted numbers of screws and some bolts, a large proportion of these are of a size or in a material not suited for cold heading or are required in quantities too small to justify the cost of tools for cold heading. In other words, the cold header gets a greatly preponderant share of the screw and bolt business in types requiring long runs, its great economy of material being a large factor in this business, as is also the rapid production. A similar, though not identical condition, applies in the case of other long-run parts which can be made by either method. It might become identical if engineers and purchasing agents were more generally aware of the character of work the cold header can perform or if they were better acquainted with the economies of cold heading.

It happens that the metalworking industry is in, or rapidly approaching, a position where it is faced with a shortage of a wide range of materials, including many grades of steel, brass and other materials extensively worked by the screw machine and by the cold header. Economy in these materials is of great importance to all. It is also true that the demand for screw machines is at, or close to, an all-time high and that makers of screw machine products generally are avoiding new business because of the inability to take care of regular customers and such new ones as they are committed to serve. Although the makers of cold headed products are in a similar position in respect to some of their equipment, some at least still have added capacity for production and some can increase this capacity if it appears wise to do so.

With this in mind, the author gained the cooperation of experienced men of the Lamson & Sessions Co., large producers of cold headed products, to gather examples of cold headed parts known to have been produced at lower costs than if made on the screw machine. It is believed that examination of these specific examples is likely to point the way to economies in

r or Screw Machine?

By HERBERT CHASE

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PARTS with unsymmetrical heads or eccentric heads or bosses. These are made in cold headers.

THIS group of cold headed products include a large number with special heads of odd shapes and a few which could be duplicated on the screw machines.

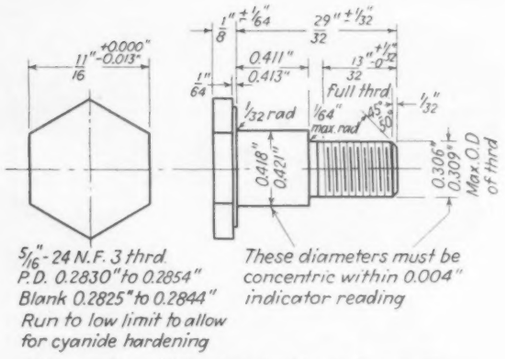


Fig. 1—This cold headed shoulder bolt costs 50 per cent less than if made on a screw machine. It is made of SAE 1020 steel.

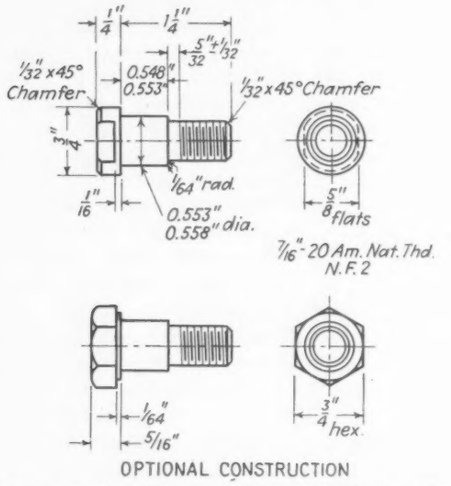


Fig. 2—Optional designs of shoulder bolts for cold heading or screw machine production. Steel used is SAE 1010, 1112 or X1112.

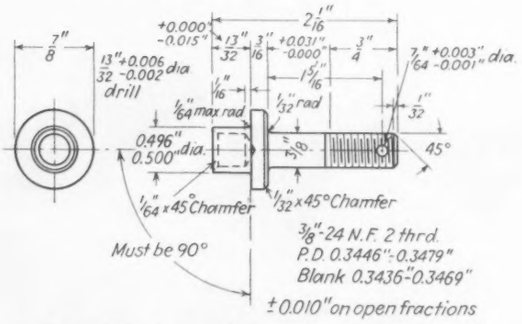


Fig. 3—Cold headed bolt with special drilled head. Steel used is SAE 1020.

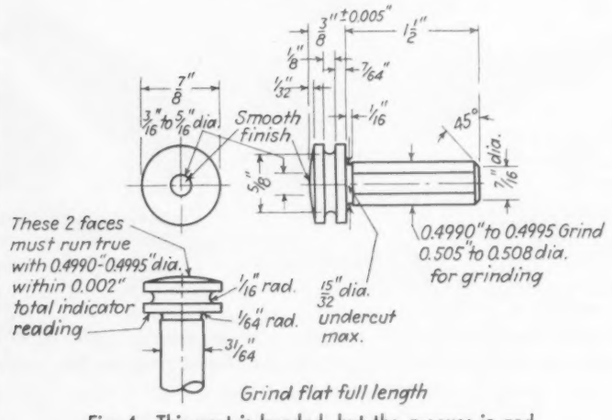


Fig. 4—This part is headed, but the grooves in and below the head are turned. Steel used is SAE 4140.

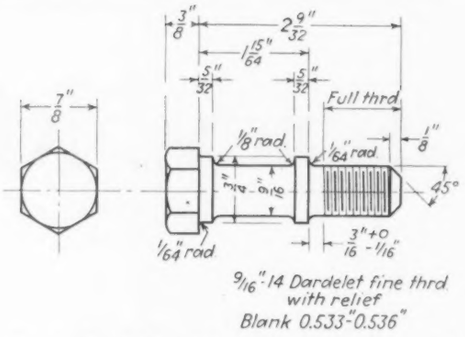
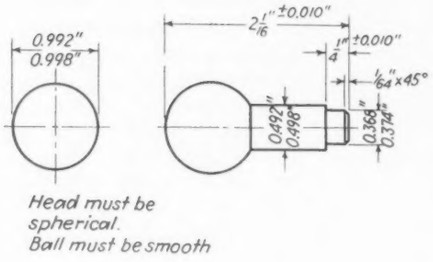


Fig. 5—Special headed bolt in which the necked portion is turned. Steel used is SAE 1035.



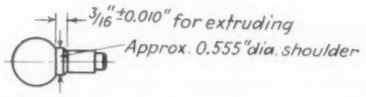


Fig. 6—Ball stud headed as in small sketch and subsequently shaved. Steel used is SAE 1020.

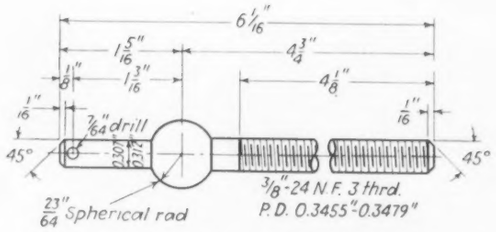


Fig. 7—The ball on this rod is produced by heading, and short end is extruded.

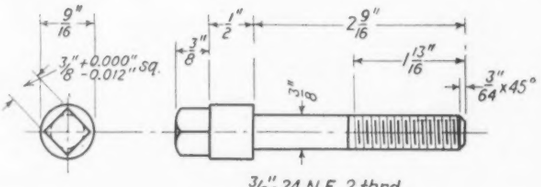


Fig. 8—Headed product with small end extruded and square broached.

threads. These are said to be both stronger and smoother than cut threads, although opinions differ somewhat on these points. In any event, class three fits, regarded as difficult when cut on the screw machine, are produced by rolling, and exacting aircraft specifications are met. Thread rolling is often done, of course, on screw machine products, occasionally in the screw machine itself. Several other secondary operations usually are required on cold headed products, some of them being needed also if the basic product is manufactured on the screw machine.

Illustrated in Fig. 1 is a cold headed product typical of many rather conventional shoulder screws. It is produced completely in the header except for reducing the diameter for the thread. The cost, however, including the secondary operations, is about 50 per cent less than if produced by the screw machine, chiefly because of the saving in stock. Dimensions are readily held and the 5/16-24 N.F. thread is a No. 3 fit.

Another shoulder screw is shown, in Fig. 2, chiefly because the purchaser is aware that it can be made either by cold heading or on the screw machine and permits alternative constructions as to the head and also allows three options as to the steel which may be used. SAE 1010 steel is suitable for cold heading, whereas SAE 1112 and X1112 are good screw machine stocks. The hex head design can be made complete, using hex stock, on the screw machine, but if the round head with flats were to be made on the screw machine, a separate milling (or equivalent operation) to form flats would be necessary. Either form can be cold headed—and probably much more cheaply—chiefly because of the saving in stock but also because of saving a trimming operation.

The special bolt, Fig. 3, originally made with radial serrations or knurling on the side of the flange away from the threaded end might be regarded as a "natural" for the screw machine, partly because the projection next to the flange has to be drilled out, whatever method of construction is used. This operation would be done as one of those on the screw machine but separately on a cold headed part. The latter also requires a separate shaving operation on the flange. Cross-drilling is often done on stock transfer attachments used with screw machines, but is a separate operation on the cold headed part. Despite these considerations, the cold headed part is reported about 50 per cent cheaper than the screw machine product, partly because of the great saving in steel, as 3/8-in. wire does the trick in cold heading whereas 7/8-in. bar is needed for the screw machine product. Radial knurling is done as a part of the cold heading; it is not a separate operation and does not require a knurling tool, as the serrations are made in the die and are duplicated on each piece.

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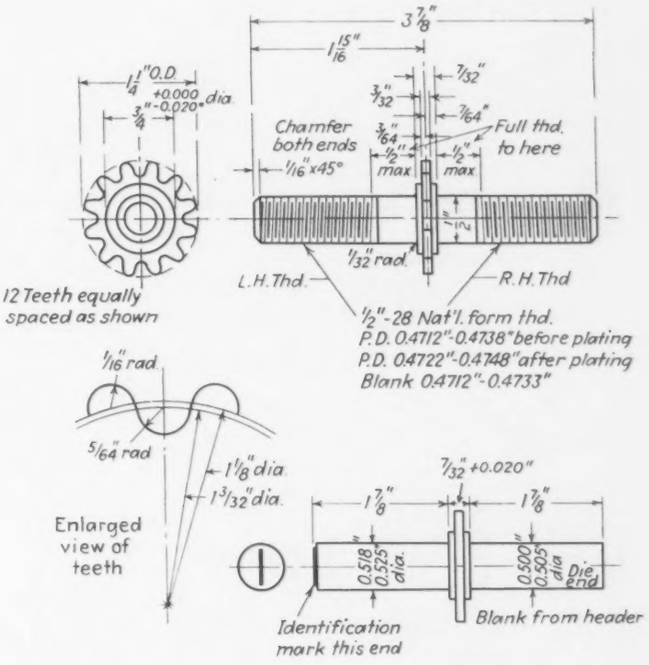

FIG. 9—Brake adjusting part with flange headed at center. Serrations trimmed later.

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Although the piece with a circumferentially grooved head, shown in Fig. 4, requires finishing all over after cold heading, it has proved to be about one-third cheaper in that form than when made on the screw machine because of more rapid production and saving in stock, which is optionally SAE 3135, 3140 or 2340 nickel bearing steels. However produced, the stem and the flat thereon have to be ground to hold the close limits specified. The grooves in the head and under it cannot be formed by cold heading, but are cut subsequently at the same time that the rest of the head is shaved. Such operations are done at high speed in an automatic shaving machine.

Parts, such as that in Fig. 5, which require a necked portion are not produced entirely by cold heading, but the blank is so produced and the neck is cut subsequently in a shaver which, at the same time, reduces the diameter on which the Dardelet thread is rolled subsequently. A piece of this shape is cold headed with a 3/4-in. diameter shank, using 3/4-in. stock on which the hex head is upset. There is some scrap in the shaving operations, but much less than if the piece were machined from 7/8-in. hex stock, such as would be required for the screw machine, and the cost is about 20 per cent less than for production by screw machine.

Products having heads forming a nearly complete sphere, as in Fig. 6, are often produced on the screw machine but can be made more cheaply by cold heading. That shown is 35 to 40 per cent lower in cost. In this case, the piece is made from stock of 0.555-in. diameter, as shown in the lower view, after which the shank is extruded to specified diameter, but leaving a shoulder of the stock diameter. The head, of course, is upset by the heading operation. Subsequently,

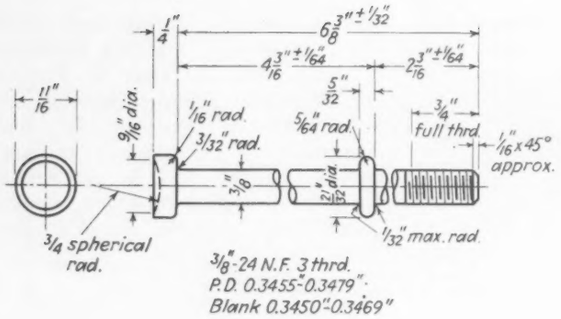

FIG. 10 — Part produced by heading and then reheading to form flange.

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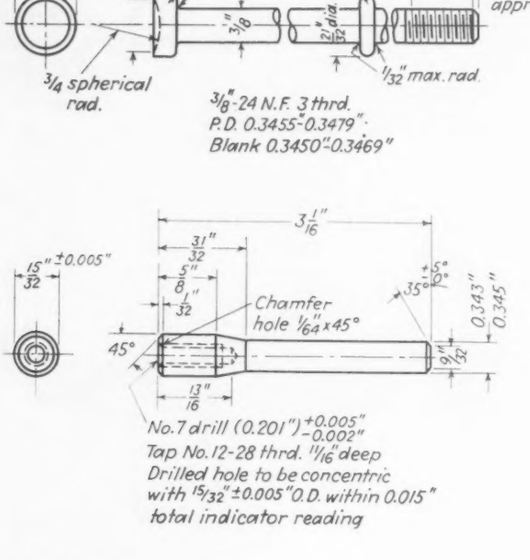

FIG. 11 — A simple headed part in which the hole is afterward drilled and tapped.

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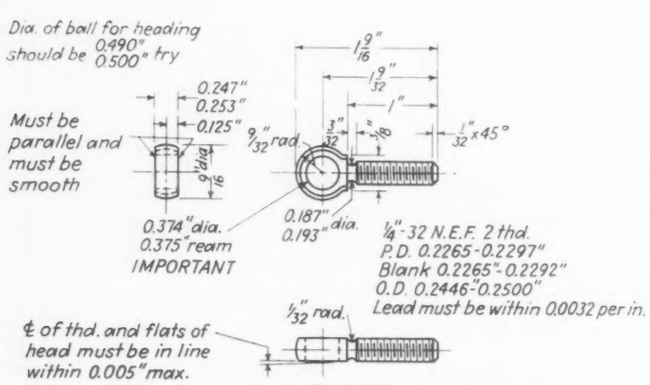

FIG. 12 — Headed eye bolt for aircraft applications. Steel used is No. 410 stainless.

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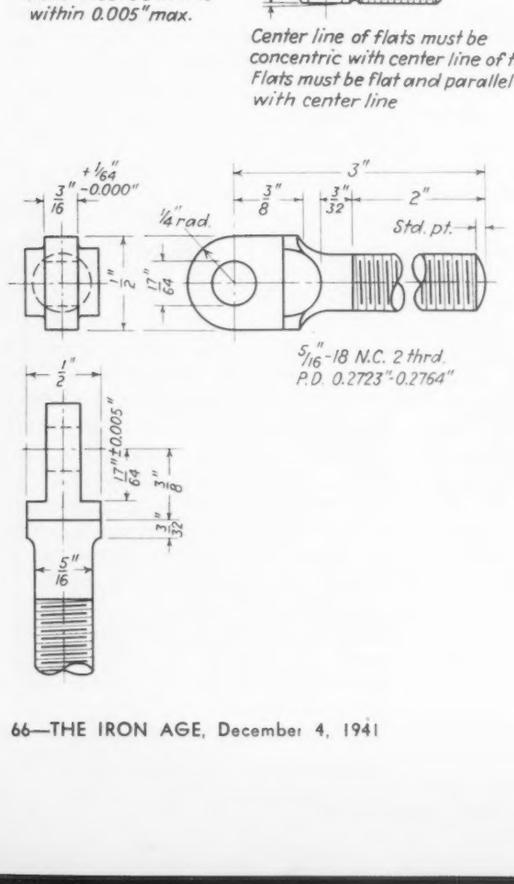


FIG. 13 — Eye bolt made by heading, the flats at the eye being broached.

the piece is chucked on the extruded diameter in the collet of a shaving machine fitted with a forming tools which cuts away the shoulder and shaves the spherical surface.

A piece such as that shown in Fig. 7 is produced by heading from wire of approximately the pitch diameter of the long thread. In this case, the shank at the other side of the ball is, initially, of stock diameter and the ball is headed in the position shown. The short shank is then reduced to specified diameter by a separate extrusion. Pointing (chamfering) of the ends and cross drilling require separate operations, as does the shaving of the ball surface. Nevertheless, there is a marked saving in cost over screw machine production, as the latter would require the use of stock at least 23/64-in. diameter with relatively slow removal of much wasted material.

In producing the piece shown in Fig. 8, 3/8-in. wire is used and the head upset is a cylinder 9/16 in. in diameter and 7/8 in. long. As the thread is rolled, it is necessary to reduce the diameter on which it is made, so that after the operation, the crest diameter will be the same as the diameter of the stock. Reduction in diameter for rolling is done by extrusion. The square head is broached. Cost is somewhat below that for the screw machine equivalent, as that too would require either broaching or milling the head square in a secondary operation and more stock would be needed.

About 50 per cent reduction in cost resulted from converting the brake adjusting part, Fig. 9, from screw machine to cold heading. In this case, the stock used is of 0.518 to 0.525 in. diameter and the blank is upset to form, at the center, a flange 1¼ in. o.d. and 3/32 in. thick with bosses on each side, as shown in the lower sketch. Subsequently, serrations are cut in the edge of the flange in a separate blanking operation, just as would be necessary in a blank produced by screw machine. As it is specified that the ends must not have an eccentricity greater than 0.010 in. total indicator reading, the ends of the blank are made oversize and are reduced by shaving to correct diameter for rolling the thread and to maintain the required limits as to eccentricity.

Although necked pieces, such as

that in Fig. 10, are not commonly produced complete by cold heading, it is feasible to do so economically by the following means: Stock of 3/8-in. diameter is upset to form, in a single blow, the head of the piece, including the recessed spherical surface, leaving a long shank of stock diameter. Blanks thus made are reheaded at the other end to form a flange of 21/32-in. diameter, rounded as shown. This is done in a semi-automatic open die header and at the same time the end is extruded to the diameter for rolling the 3/8-24 thread which is made to No. 3 tolerances. This is an aircraft part and is made from SAE 1020 steel. To produce it by screw machine would require the use of stock at least 11/16 in. in diameter and result in much waste of material and about 75 per cent higher cost.

A part such as is illustrated in Fig. 11 is simply produced without a great waste of material in the screw machine, yet reports show a 50 per cent saving by production in a header from stock 0.460 in. in diameter. There is only slight upsetting of the large end and the shank is reduced in diameter by a double extrusion. Drilling, tapping and chamfering the end are secondary operations.

An eye bolt of the design in Fig. 12, when made by cold heading, costs about half as much as for screw machine production, even though, as on the screw machine, the head is formed in spherical shape, the flats are milled and the cross hole is drilled and reamed in secondary operations. The neck below the head is turned on the headed blank at the same time that the ball is shaved. Both types of parts require hand polishing of the head on a wheel to remove scratches, so as to meet exacting aircraft specifications. In the case of eye bolts which are made, as in Fig. 13, with much less exacting tolerances, and in which the head is upset in a section that is nearly square and is afterward thinned at the eye portion (the radius at the end being formed in the heading), costs are still lower in proportion than for screw machine equivalents.

Parts with an eye well away from the end, as in Fig. 14, are not difficult cold heading jobs but cost much more if made on the screw machine. In this piece, the wire is of 0.330-in. diameter and a near sphere is upset to form the eye. This portion is subsequently flattened in a press to give the specified thickness of the area around the hole, which is later drilled. The drilling and the slotting are secondary operations, as they would be in a screw machine product, which would have to be made from stock of about twice the diameter used for heading and would involve a high scrap loss as well as slow production.

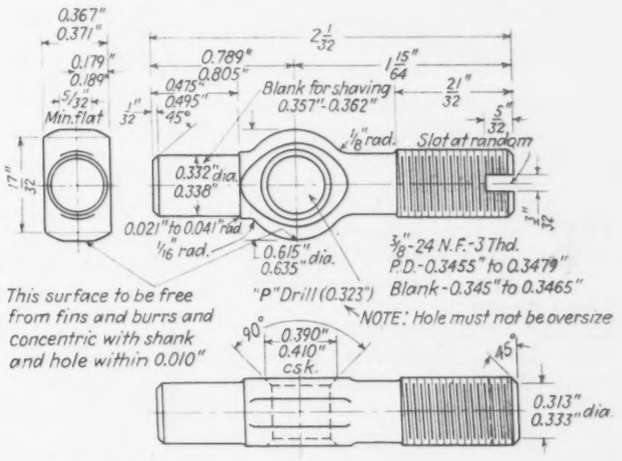


FIG. 14 — Headed product with eye formed near the center and later flattened in a press.

Space limitations do not permit going into details as to cold headed parts having heads of odd shape, some of them non-symmetrical in reference to the axis of the shank. One illustration shows several such parts, some of which cannot be produced at all on the screw machine and none with the economy possible in cold heading. Upset heads can be pointed, beveled, serrated on the under side and otherwise shaped in an irregular way. Heads can even have eccentric bosses below them or be eccentric themselves.

Many nuts of different designs are also produced by cold heading starting with wire stock not much larger in diameter, as a rule, than the hole ultimately made in the nut. As this stock is flattened, its exterior is changed, as a rule, to a square or hex shape and a depression is made to force some of the metal where the hole comes to flow outward. Finally, the remaining metal in the hole is sheared out by punching out a slug which is the only scrap formed except for that removed in subsequent tapping. Nuts for special purposes have a lip at the top to be spun over and thus fasten the nut in a square hole in sheet metal. Many other special shapes of nuts are produced, some of them not capable of duplication in the screw machine. Flanged nuts are readily cold headed. Production is rapid and economy in metal is high.

Although the foregoing may appear to put the screw machine product in an unfavorable light, its utility is too amply demonstrated to be open to question for an exceedingly wide range of parts. The screw machine can, of course, produce many parts which cannot be reproduced by cold heading. Many which can be cold headed in blank form require so much work in secondary operations (especially inside operations) that production on the screw machine is more economical. It has been, however, the purpose of this article, for reason stated, to emphasize the reverse aspect of the matter.

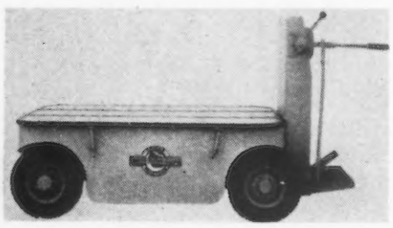
Naturally, both types of machines have both advantages and limitations. The cold header, for example, rarely handles stock over 1 in. or less than 1/16 in. in diameter or over 8 in. in length, whereas the screw machine often works well outside these limits. Both types of machines are well established on a sound economic basis and in the long run will, or already have, gained ascendency where their advantages are put to best use and their limitations are avoided.

New Equipment . . .

Material Handling

Some of the more recent developments in conveying equipment, cranes, lift tables, electric trucks, dumping facilities, hoists, and accessories to plant equipment are discussed herein.

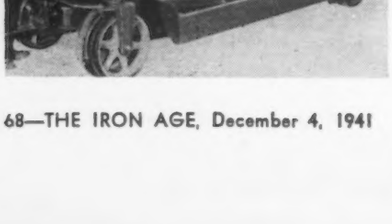
"K-39," one of the newest truck models of the *Crescent Truck Co.*, Lebanon, Pa., features quiet electric motor operation and demountable pneumatic tires. Developed to meet inter-departmental transportation



needs over floors not generally suitable for truck and tractor usage, these features make "K-39" practically noiseless in operation. With half-ton capacity, the truck is suitable for general utility work.

Hydraulic Lift Truck

FOR handling large machine tools up to 35,000 lb., *Lewis-Shepard Sales Corp.*, Watertown, Mass., developed an extra-large hydraulic hand-lift truck. The truck shown



has a platform 10 x 5 ft., with a lowered height of 15 in. Rear wheels are mounted on heavy-duty roller bearings and the two pair of front wheels, 20 in. in diameter with a 5-in. face, are mounted in yokes with king pins and drag link connections. The truck is equipped with a towing hook at the front. The frame is arc-welded throughout and braced in every direction to prevent deflections. The lifting mechanism is enclosed in a dustproof housing, controlled by a variable speed dead-man type control that can be locked at any height.

Lead Battery Charger

GENERAL ELECTRIC CO., Bridgeport, Conn., recently announced their new Tungar two-rate automatic battery charger for use with small electric trucks having 6 and 12 volt lead batteries. The charger can also be used for charging heavy duty 6 and 12 volt ignition and starting batteries used in gas trucks. The Tungar starts charging at 40 amp., and continues at this rate until the battery is 80 to 85 per cent charged, when it automatically reduces to 16 amp. Charging continues at 16 amp. for 3 hr. and then shuts off automatically. A chart that shows charging-hour vs. specific gravity at the start for the various types of batteries is permanently fixed on the control panel, enabling operators to determine charging time required after measuring the specific gravity of the batteries. An ammeter indicating the charging rate is also part of the equipment.

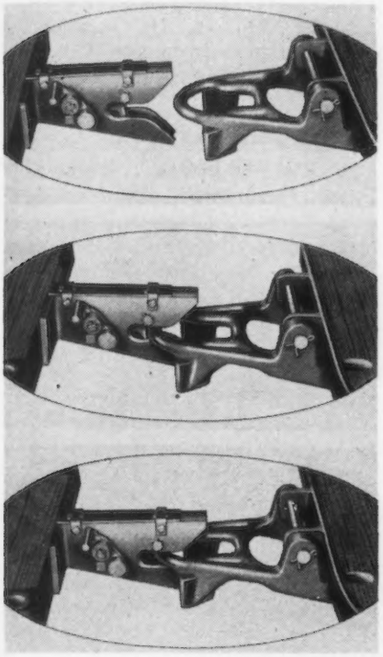
Portable Elevator Hinged Sections

A SPECIAL spring balance device for easing the raising and lowering of the hinged section of portable elevators where frequent hinging operations are necessary has been developed by the *Lewis-Shepard Sales Corp.*, Watertown,

Mass. Powerful compression springs within the cylinders balance the weight of the upper frame, enabling one man to raise and lower the frame quickly. This spring balance will balance hinged sections 8 ft. long and can be included on all hinged types of new stackers.

Ball Type Coupler

A BALL type automatic coupler for tractors and trailers has been announced by the *Service Caster & Truck Co.*, Albion, Mich. The



coupler is springless and will prove as sharp and positive in action after 10 years of service as when new, it is claimed. Coupling is automatic, and uncoupling is accomplished without stopping and backing up to make slack, its grip being released under draw-bar tension. As the bale-end approaches the coupler, it pushes the fingered trigger forward, automatically closing the gate, and a steel ball seats, locking the trigger. The cam, attached to the trip, falls free. To uncouple, the trip is depressed, releasing the ball which, in turn releases the trigger.

Switching Locomotive

H. K. *PORTER CO., INC.*, Pittsburgh, recently announced a new 65-ton, double power plant locomotive for general industrial and switching use. Powered by two Cummins supercharged diesel engines developing 200 hp. each, the locomotive has a tractive force of 39,000 lb. at 30 per cent adhesion. Overall size is 12 ft. high x 9 ft. 6 in. wide x 33 ft. long, and its total weight is 130,000 lb. This locomotive is built for both standard and 36 in. gage track. Each engine has a fuel distributor, forced feed lubrication, centrifugal cooling pump, and a 32-volt, automatic starting motor with a 350-volt generator. Eight 33 in. drive wheels are arranged on two four-wheel trucks, each equipped with two high speed generators and four high speed motors. Each axle is driven by one motor with reduction gears, the ratio being 14.7 to 1.

Battery Charger

AN improved line of fan-cooled copper-oxide battery chargers for charging 12, 15, or 18-cell, electric truck lead batteries, or 16 to 24-cell Edison type batteries right where they are used has been announced by the *General Electric Co.*, Bridgeport, Conn. These chargers can be installed easily anywhere in the operating territory of the trucks when 3-phase a.c. power is available, saving time and battery power lost in running trucks to and from a central charging sta-

tion. Noon hour boosts can also be given the batteries. The chargers occupy less than 3 sq. ft. of floor space, require no base or mounting bolts and can be transferred from one place to another. The charger is simple to operate, has various safety controls for power failure, ventilation failure, and shuts off when the charge is completed. Various models for 220 and 440 volt current, and for lead and Edison type batteries are available.

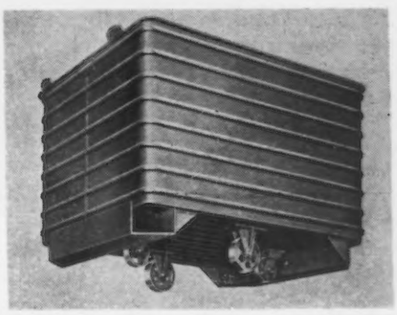
2½-Ton Liftable

A NEW 2½-ton Liftable, recently announced by the *Service Caster & Truck Co.*, Albion, Mich., was designed to handle dies and as a feeding table for press work. The work can be loaded in the warehouse onto the table and the table rolled to the press. It is also ideal

for handling large storage batteries from the electric mule to the charging rack. The table is raised and lowered by a vise-type handle, the lifting mechanism consisting of a steel screw which actuates the lifting chain. The table is 4 x 5 ft., with a top having a double row of 2½ in. rollers running on sealed ball bearings. Height of table extended is 36 in., and lowered is 24 in. A cam lock holds the table at any working height. A 2000 lb. capacity table with a flat steel top is also made.

Tiering Dump Box

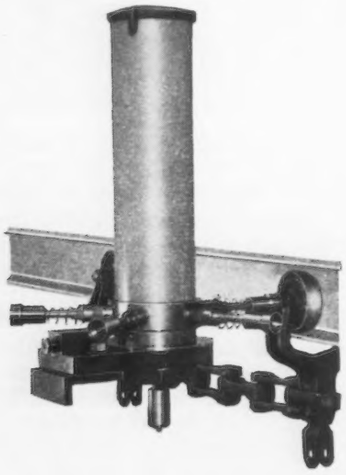
CORRUGATED steel box, designed especially for use with lift trucks equipped with revolving type forks, has been introduced by the *Union Metal Mfg. Co.*, Canton,



Ohio, for handling scrap, small metal parts, etc. Special fork pockets are welded to the bottom at either end and run the full length of the box. When forks are inserted in these two pockets, the box can be lifted, turned over and righted again. Top flange can be equipped with tiering or crane lugs for efficient storage and handling. Casters facilitate short spottings.

Trolley Bearing Lubricator

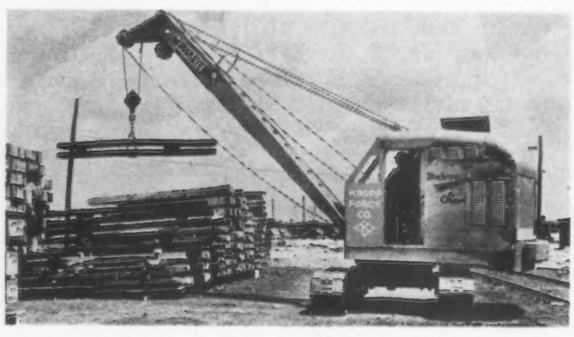
A MEANS of automatically applying lubricants of varying body, from oils to heavy fibered greases, to the bearing of conveyor trolley wheels was recently introduced by *J. N. Fauver Co., Inc.*, 44 West Hancock Avenue, Detroit. The Fauber grease lubricator is a self-contained unit that is mounted on a bracket attached to the conveyor rail or an adjacent base and is driven by the conveyor itself. A grease reservoir with five pumps,



each with a pressure type injector guided to the wheel hub bearing by a pilot, makes up the lubricator. A cam, attached to the pump housing, insures that each injector is properly positioned to contact each wheel hub. This lubricator can be adjusted to deliver any quantity of lubricant from none to the maximum required, has no drip, and maintains greater efficiency with less down time for conveyor repair.

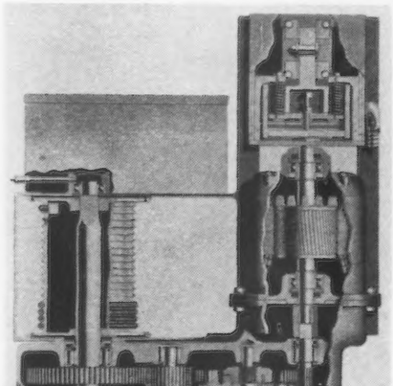
Yard Crane

A YARD crane with a short, gooseneck boom, providing for greater stability under heavy loads, and facilitating car loading and unloading as well as working in close quarters has been developed by the *Buckeye Traction Ditcher Co.*, Findlay, Ohio. The gooseneck on the boom permits handling long objects in confined spaces, and material can be stacked 20 ft. high or more. Vacuum power controls all operations in the work cycle of the crane, permitting smooth, fast operation, enabling the operator to handle more work with less fatigue, and eliminating trouble from freezing in winter and condensation of moisture in summer. This Buckeye Clipper gooseneck crane also features a 175 ft. per min. minimum hoist speed, welded steel box type boom, safety power drum brakes, minimum of 5¼ r.p.m. full swing, power boom hoist and safety brake, flame hardened gears, and other similar characteristics that insure utmost in service and greater durability.



Electric Hoist

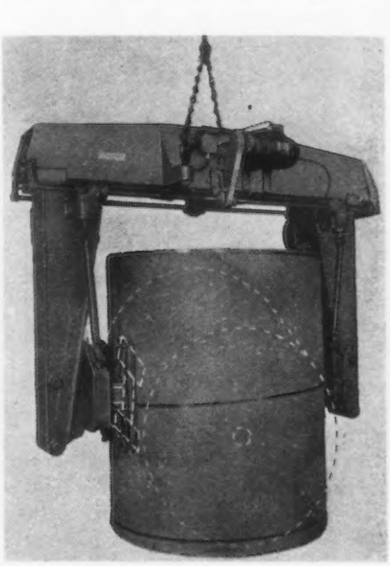
THIS new steel hoist, to provide efficient, low-cost material handling for all types of industry, was recently developed by *Robbins & Myers, Inc.*, Springfield, Ohio. Known as the F-½, it is built in



1000 and 2000 lb. capacities. It is compact, designed to occupy a minimum of headroom space, and control is by means of push-button pendant with single or two speeds for polyphase a.c. current. Provision is also made for 110 to 220 single-phase current. The load-brake controls speed when the load is lowered and prevents the load from dropping on power failure. The hoist drum is jig welded from steel pipe and flanges. Entire lift of the hoist is provided without over-ride of the cable. This hoist can be applied to any make of monorail and motor driven trolleys.

Crane Roll Grab

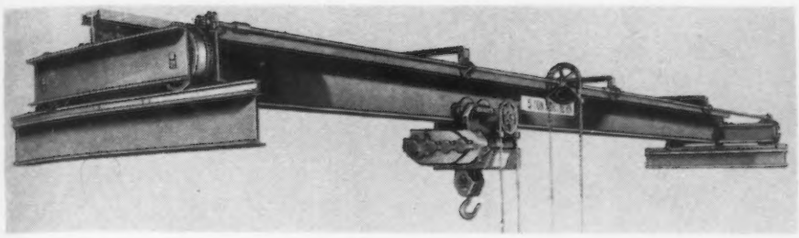
A NEW, completely motorized roll grab has been developed by the *Cleveland Crane & Engineering Co.*, Wickliffe, Ohio, for use



with overhead materials handling systems. The grab will handle rolls from 16 to 60 in. in diameter in lengths up to 72 in. and weights up to 5000 lb. All motions are motorized and controlled by the crane operator. Three motors are provided, one spreading and retracting the arms, another squeezing the roll grippers after they have been brought close to the roll, and the third operating the turn-over mechanism enabling a roll in any position to be picked up and placed in any other position. The grab and variations of it are suitable for handling rolls, bales, barrels, boxes and other such items.

Hoist Cranes

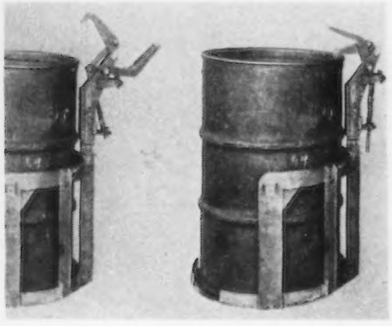
NORTHERN ENGINEERING WORKS, Detroit, now offer a a line of electric hoist cranes for auxiliary use in large plants and main hoisting systems in small plants. The cranes, built in various



capacities up to 15 tons, are constructed in many styles: Top running or underhung, hand or motor traveled bridges and hoists, transfer types, and special double hook types. Cab control is furnished if desired. These cranes have a modern, low headroom hoist, and will give maximum hook lift, continuous operation, positive control and safe handling.

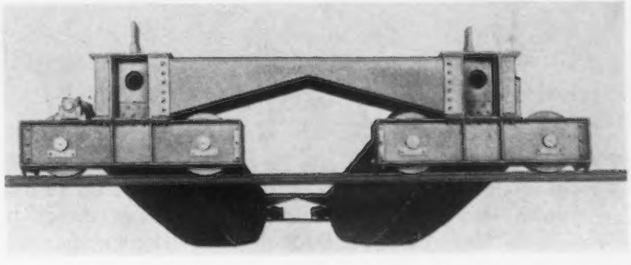
Barrel Dumper

A NEW, quick locking harness to speed up the handling and dumping barrels and drums has been developed by the *Lewis-Shepard Sales Corp.*, Watertown, Mass. The harness is equipped with a spring toggle, is arc-welded throughout, and can be made for any size of drum or barrel.



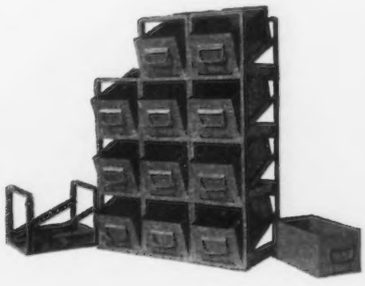
Crane End Tie

FOR large, heavy capacity cranes like those used for power houses and other moderate services, requiring eight bridge track wheels, the *Cleveland Crane & Engineering Co.*, Wickliffe, Ohio, developed a novel crane end-tie that is simple in design. The tie is made of a heavy rolled steel plate that is cut to shape and bent to form a box section. Into the box section are welded reinforcing diaphragms to effect the required rigidity. This end tie construction is known as a "spring type," since it has sufficient spring to allow all wheels to bear properly on the track at all times.



Storage Racks

STACKBIN CORP., Providence, R. I., has recently announced a new type of rack designed to store ordinary shop boxes at an angle which converts them into hopper-fronted storage bins and automatically feeds contents toward the front. These slant-box racks have tilted runners that hold the boxes at the proper angle, and a wide lip keeps them securely in position. The racks are made in sizes to fit individual needs.



Shovel Truck

A LINE of two-wheel hand shovel trucks has been announced by the *Pollard Brothers Mfg. Co.*, 5500 Northwest Highway, Chicago. By a recent change in the design of these shovel trucks, they are especially adaptable for sliding under barrels, boxes, and other hard-to-handle material both in shops and in shipping departments. The main body of the trucks are reinforced, making for safer and longer life of the trucks.

Steel Strap Holder

A NEW strap holder for steel dispensing strap in shipping departments has been developed by the *Signode Steel Strapping Co.*, Chicago. The holder can be used under a bench or packing table or on portable reels, the strapping feeding smoothly from the inside of the coil through the top coil guard. It comes equipped with casters, affording quick and easy transfer.

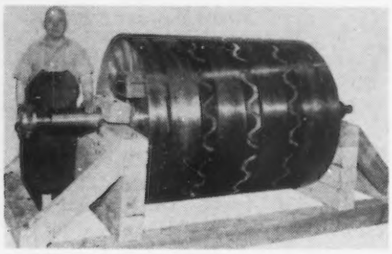
Material Screen

A NEW and different material screening principle, built into Roto-Flow, by the *Roto-Flow Screen Co.*, Milwaukee, eliminates the use of a screen and is said to be 100 per cent trouble free. Roto-Flow consists of a series of shafts that rotate cams located along and between parallel bars. Cams and bars are spaced in accordance with desired screening size. The deck is horizontal, and as material hits it, it is rolled over by agitators that remove all fines. Bouncing, jostling, and cascading are eliminated, cutting breakage to a minimum. In handling coal, 33 1/3 per cent more can be screened than by other processes. Screens cannot be clogged, as the agitators clean the bed of the machine 400 times a min.

Large Magnetic Pulley

THIS high intensity magnetic pulley, 48 in. in diameter with a 63 in. face width was built by the *Dings Magnetic Separator Co.*, Milwaukee, to be applied as a magnetic head pulley of a coal conveyor belt, for automatic extraction of tramp iron, protecting crushers and pulverizers from damage. It is of high intensity, serrated, air-cooled design, incorporating radial and longitudinal ducts to provide for maxi-

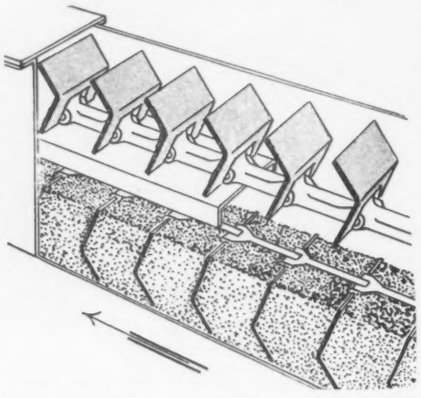
mum air circulation through the coil area. The separator weighs 18,000 lb., and 7.8 kw. are consumed in the energization of the 5900 lb. copper wire magnetic coils, which



are comprised of 130,000 amp. turns. Coil covers and end rings are of non-magnetic bronze, preventing short circuiting of the magnetic lines of force.

Bulk Conveyor

BULK-FLOW, a distinctly new and different power-operated conveyor system for handling flow-



able granular, crushed, ground, or pulverized materials of a non-corrosive, non-abrasive nature in capacities of 1 to 140 tons per hr., has been recently announced by the *Link-Belt Co.*, Chicago. The system employs a specially designed chain, to which solid peak top flights are attached at every pitch. These divide the material in the conveyor duct into a series of batches that are moved by the peak top flights, whether there be a full or only partial load. Bulk-Flow units may follow almost any desired path, horizontal, inclined, vertical, or curvilinear, and a single self-contained unit may carry in all these directions in the same vertical plane. The system is compact, loads itself from hoppers, bins or chutes, and operates smoothly and quietly at speeds of 10 to 80 ft. per min.

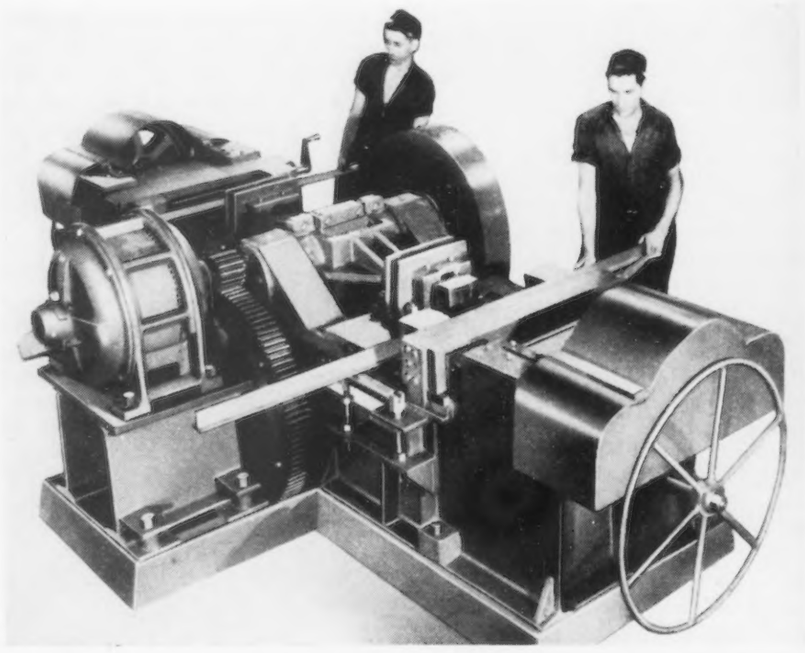
New Straightening Press

A NEW double head straightening press, used to straighten carbon, alloy, heat treated steel and non-ferrous bars, shapes, pipes, tubes, rails, and other products in sizes up to 6 in., is being manufactured by the Sutton Engineering Co., Park Building, Pittsburgh. The press can also be used as a breakdown straightener for removing excessive hooks and bends before passing material through a roll straightener.

It has a double head, permitting two different sections or sizes to be straightened simultaneously, as illustrated. This feature is particularly applicable to the straightening of flats, as one side of the machine can be set for edge straightening and the other side for flat straightening.

This straightening press operates at 28 strokes per min., using a 20 hp. a.c. or d.c. 900 r.p.m. motor. Large handwheels on each end of the press permit easy in and out adjustment of resting blocks, increasing or decreasing the deflection.

With the exception of the rams which are steel forgings and the slide blocks which are steel castings, the machine is of built up welded construction, making it light, strong, and rigid. All gears are completely guarded and the flywheel is enclosed in the main driving gear to conserve space. Rollers at each side of the machine permit easy positioning of material during operation.



THIS straightening press can be used to straighten carbon, alloy, heat treated steel and non-ferrous products in sizes up to 6 in., or used as a breakdown straightener for removing excessive bends prior to passing material through a roll straightener.

THE MARK OF QUALITY

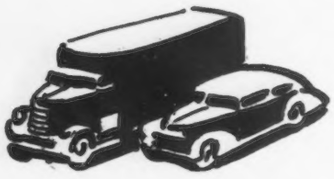
"A. W." is the sign of hidden value that steel buyers know and recognize. "A. W." is the symbol of one complete control—from Mine to Consumer. We can furnish Carbon, Copper or Alloy flat-rolled products —in *any* open hearth analysis to meet your specifications. Welding qualities, toughness, abrasion resistance, ductility . . . Ingots, Billets, Blooms, Slabs, Sheared Plates, Hot Rolled Sheets. Floor Plates for every flooring need. Steel Cut Nails in all types and sizes. "Swede" Pig Iron — Foundry, Malleable, Basic, Bessemer. "A.W." Products have been an accepted standard for steel buyers for more than a century.

ALAN WOOD STEEL COMPANY, CONSHOHOCKEN, PA.

SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES – Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, St. Paul, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

Assembly Line . . .

• Drive to discredit auto industry's part in defense program begins, as forecast . . . Because designs have not yet been "set" by government, some plans have not yet reached the starting point.



DETROIT—Exactly 17 months ago today we wrote here "The time will come . . . when industry will be forced to shoulder blame because the defense program has not by that time flowered into large-scale production of military necessities" and pointed out that industry could not later be held responsible, especially by axe-grinders and political self-seekers, for failure to produce defense items not then (months ago) ordered or even designed. (See IRON AGE, page 86, July 4, 1940.)

That time seems now to have arrived, and someone with an axe to grind is launching a program of calumny.

It is being charged by the UAW-CIO, largely through the voice of George F. Addes, secretary-treasurer, that unwillingness of automobile manufacturers to engage in defense production, as long as they were permitted by the government to continue automobile production, is blamable for "the inexcusable delays" in the Army bomber production program. Addes criticized by name the Briggs Mfg. Co., Murray Corp. of America, Chrysler Corp. and Hudson Motor Car Co. He said that, compared with the records of other automobile companies, the production of the Ford Motor Co. was "a colossal achievement." Information supplied by union tool and die makers disclosed the situation, Addes declared in releasing his story to newspapers.

Other specific criticism by Addes includes this statement:

"Briggs started tooling up for airplane production more than a year ago, but there is just a mere dribble of airplane parts flowing from the assembly lines for Boeing, Sikorsky, Martin and Douglas bombers. Murray began tooling eight months ago but the day is still far distant when the completed assemblies will flow from their production lines for Douglas and Boeing planes. The Chrysler sub-contract for Martin bomber parts was obtained six months ago. Using space in the Graham-Paige plant, the company is placing machinery daily, but tools, jigs, fixtures, etc., are not in sight at this time. Production is very meager on Martin bomber parts at Hudson, although the tooling program is about completed."

Addes stated that contributing factors in the delay included frequent design changes by the Army and Navy and rejections by prime contractors, particularly on the West Coast, after parts had passed inspection even by the Army and Navy in Detroit.

ADDES' outburst brought from some men in the industry the reply that Addes spoke only from the depths of his ignorance of the subject. One newspaper here kept the story out of its columns on the theory that it represented only the opinions of some disgruntled employees.

If either of these beliefs was true, there would be no point in answering the UAW blast.

But Mr. Addes is not ignorant of the true situation, nor does the complaint represent merely grumbling.

Addes is the man with an axe to grind, and he is grinding it just the way we had in mind 17 months ago when we said "the time will come . . ."

In the same article, 17 months ago, another sentence read "When the day of final reckoning is reached, the efficiency of the industry in tooling up for military necessities must be measured from the date of the official go-ahead signal, not from some day in May or June, 1940, when the project was first discussed by the government."

That sentence is pertinent to the present discussion.

Specifically, and first on his list,

Buick Promotions

O. W. YOUNG, executive assistant in charge of all automotive and Defense manufacturing.

W. N. LARKE, manager of manufacturing in charge of Flint operations

B. H. NEWELL, general superintendent of automobile production

A. R. MIDDLETON, assistant general superintendent of automobile production

JAMES LANGFORD, superintendent of the sheet metal plant.

FRED LETTS, general superintendent of all defense production in Flint

FRED N. MOORE, assistant general superintendent of defense operations

NORMAN HARVEY, superintendent of the tool room.

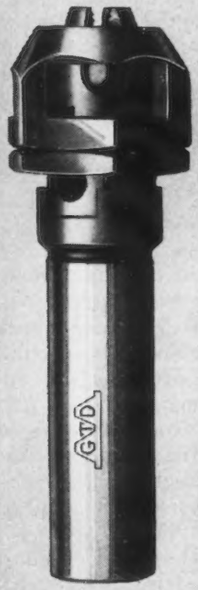
HENRY JACKSON, assistant tool room superindent

FRED PYPER, general master mechanic for automotive and defense operations.

RIGHT or WRONG?

. . . TEST YOUR KNOWLEDGE OF "ACORN" DIES

"*Acorn*" Dies are furnished in 5 different sized blanks.



Regular "*Acorn*" Die holders for screw machines that reverse die or rod automatically.

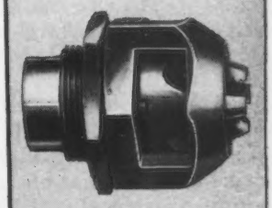
HERE are 12 questions about "*Acorn*" Dies. Out of 7 tool foremen who recently tackled them, only one was able to score 100%. How about you? Don't peek at the answers in the lower right corner till you've checked your knowledge.

1. "*Acorn*" Dies can be used on all makes of hand or automatic screw machines, turret lathes, bolt cutters, drill presses, etc. ☐ Right ☐ Wrong
2. "*Acorn*" Dies can only be used on fixed centers. ☐ Right ☐ Wrong
3. "*Acorn*" Dies are adjustable. ☐ Right ☐ Wrong
4. "*Acorn*" Dies do not require lead screws on machines on which they are used. ☐ Right ☐ Wrong
5. "*Acorn*" Dies can be used on any machines which reverse either the die or rod when the desired thread length has been cut. ☐ Right ☐ Wrong
6. There is only one size of "*Acorn*" Die blank for all thread sizes. ☐ Right ☐ Wrong
7. There are standard holders which permit "*Acorn*" Dies to be used with "button," spring or floating die holders. ☐ Right ☐ Wrong
8. Smaller than ordinary "*Acorn*" Dies can be used with a given holder. ☐ Right ☐ Wrong
9. Each size of "*Acorn*" Die holder is available with only one size shank. ☐ Right ☐ Wrong
10. Genuine "*Acorn*" Dies have an exclusive patented "heel" on the cutting lands that prevents tearing threads on reversal. ☐ Right ☐ Wrong
11. "*Acorn*" Dies are so uniform in size that they can be removed for sharpening, or changed without checking machine set-up. ☐ Right ☐ Wrong
12. A special fixture is needed to hold dies for sharpening. ☐ Right ☐ Wrong

For years "*Acorn*" Dies have hung up amazing records on various types of production work. Consider them for any job where dies seem to wear out rapidly.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 2102 West Fort St.
WAREHOUSES in
New York, Chicago and Los Angeles
In Canada: GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

Releasing "*Acorn*" Die holder for hand screw machines.



"*Acorn*" Die Adapter, for button, spring or floating holders.

This is one of a series of advertisements published by Greenfield Tap & Die Corporation to help users get greater production from their small tools in these critical times, through making useful facts more widely known

GTD GREENFIELD
TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

1. Right
2. Wrong
3. Right
4. Right
5. Right
6. Wrong
7. Right
8. Right
9. Wrong
10. Right
11. Right
12. Wrong

Addes criticized Briggs. As a matter of record, Briggs started tooling up much more than a year ago; to be exact it was in June, 1940, that Briggs made its first move to get into the airplane business. And on Oct. 25, 1940, Briggs supplied sample parts for display at the initial meeting of the Automotive Committee for Air Defense in the New Center Building. Today it is producing much more than a dribble of parts. Exact production figures are a military secret, but the trade knows, nevertheless, that Briggs for some time has been shipping at least five sets of wings a day to Vought-Sikorsky and that Briggs is up to schedule on its Vought-Sikorsky production, on schedule on its Douglas contract, and ahead of schedule in its work for Boeing. Contracts for Martin parts and Lockheed-Vega are still in earlier stages. It is really in mass production on $40,000,000 worth of airplane sub-assemblies, satisfying its customers and the government, the UAW statement to the contrary notwithstanding.

MURRAY began its tool engineering more than eight months ago, actually had begun much of its tool engineering work before it had any contract (as did Briggs, Ford, Chrysler, General Motors and others). Despite the hush-hush of military secrecy that is thrown up every time an Army or Navy contract is in consideration, it is known that the Douglas attack bomber was substantially redesigned after Murray had begun its tooling. Bullet-proof gasoline tanks, armored cockpits, more powerful engines, stronger engine mounts and a variety of design changes contributed to the serious delay. As recently as Oct. 16, this column reported that Murray's work on wing panels had progressed as far as it could with the data then available. As a matter of fact, Douglas was then waiting for Army approval on some of the final design changes. Finally, and, we suspect, with some disgust at the red tape, Douglas issued shipping instructions for the incomplete wing. This was shipped on Oct. 28, and reached Douglas on Nov. 6. These are delays which no stretch of the imagination could attribute to Murray or to Douglas.

Murray is currently expending its own money and effort to get prepared to handle production on parts for the four-engined B-17-F, but has no contract yet. The A-20-B contract is a relatively small one, in fact was cut sharply after the Army and the British switched emphasis from twin-engined medium bombers to the heavier types; work on the B-17-F is supposed to be substituted for the reduced portion of the A-20-B contract. However, in neither case is the design completed or "frozen" in any degree.

Auto Output Up To 93,495 Mark

Detroit

• • • **Automobile production in the last week of November rebounded to 93,495 cars and trucks compared with 76,820 in Thanksgiving week, and 130,783 in the corresponding week of 1940 when there was no government ceiling on production, according to Ward's Reports, Inc.**

In passing, but by no means incidental to this discussion, it seems pertinent that the Briggs and Murray contracts were privately negotiated between these body building firms and the airplane manufacturers. In each instance, the body firms put a lot of their own money into engineering, tooling, etc., even before they had contracts. In the case of Briggs, this amounted to at least $5,000,000. Both of these companies set out on this course because they wanted to be in the airplane parts business as suppliers. It is reasonable to expect they want to be airplane parts suppliers after the War. They would be poor managers, if executives of these companies wasted company money by stalling on this aircraft parts work.

The UAW charges won't hold any water at all. There could have been no unwillingness on the part of either of these firms or they wouldn't have gone into the airplane parts business when they did —and they went into it early. We believe that Briggs was negotiating with Vought-Sikorsky before there *was* a defense program.

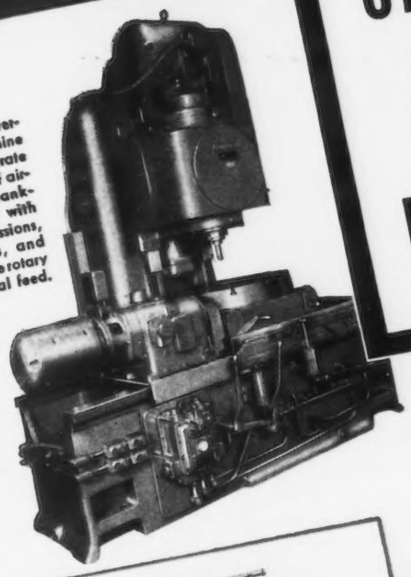
Even in the other cases where contracts have been signed for bomber production (for instance, Chrysler, Hudson) the date of signing the contract is hardly the right place to begin to measure industry's "performance." Certainly if a design is not complete and ready for production, and if tooling is delayed and frequently revised because of design changes originating with the air services, delay in getting into production is not the fault of production men. In the case of Chrysler and Hudson and the Martin bomber (and even Briggs, which also now has sub-contracts with Chrysler on this project) we might go so far as to say that the industry still has not reached a "starting point" because the design itself is not "set" yet.

HERE again military hush-hush has kept a lot of the facts under cover. But only last week in the "Assembly Line" it was stated that "slowness with which the Martin bomber program is getting underway here in several plants has been attributed to major redesign of that plane." The bomber is having a larger wing designed on to it to slow down its landing speed, the fuselage is being redesigned to provide openings in the bottom and extra fire power to cover a blind spot below and behind the plane, and the entire riveting procedure is being revamped for the elimination of many of the flush rivets previously specified. Until the Army gives Chrysler a design which is actually "buildable," delay cannot be attributed to the manufacturers.

Credit given to Ford is deserved. It ties in with the statement made here Oct. 16 that Ford is reporting consistent, rapid progress and apparently is having more luck getting design data from Consolidated on the B-24-D than some of the automotive manufacturers have had on their bomber programs. In part, observers here attribute Ford's success to the fact that it has a signed contract with the Government for a complete airplane, the B-24-E, in addition to sub-contracts to provide Consolidated and Douglas each with 600 sets of sub-assemblies for the B-24-D. Ford has never been afraid to stand up and talk things out with the Government. It insisted on having a prime contract to make complete airplanes, and got it. It has also a separate contract providing that it can make 10 airplanes and practically consign them to the scrap heap after extensive experimentation with them. This represents initiative of a high order and

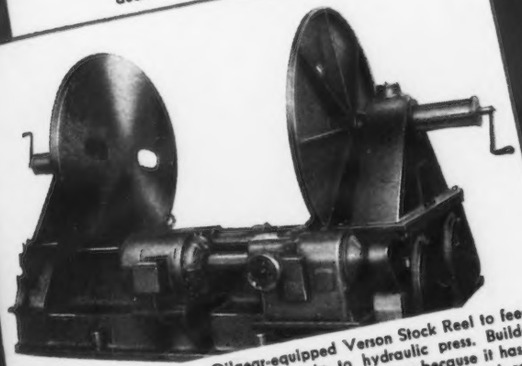
(CONCLUDED ON PAGE 120)

OILGEAR FLUID POWER HELPS YOU ANSWER *Vital* MACHINE DESIGN PROBLEMS



Davis & Thompson vertical milling machine for high speed accurate milling of inside of airplane engine crankcases. Equipped with Oilgear Transmissions, Pumps, Valves, and Cylinders to drive rotary table and lateral feed.

Five Oilgear Units in this Baker propeller-hub drilling machine perform 5 steps of drilling, facing, and chamfering to speed up propeller production for defense.



Oilgear-equipped Verson Stock Reel to feed cold-rolled strip to hydraulic press. Builder says: "We selected Oilgear because it has a range beginning at absolute zero and continuing up to maximum feed; also may be smoothly and almost instantly reversed."

FOR ease of power transmission application, for versatility of installation, for maximum production of your machines, for long, troublefree operation in the field . . . your best answer is Oilgear Fluid Power Pumps, Motors, Transmissions, Cylinders, and Valves. Note the varied applications of Oilgear shown on this page; they are a trifling few of the many tough machine design problems solved by manufacturers in many fields.

Oilgear Fluid Power Systems are compact, simple, easy to install. They present smashing advantages over mechanical drives and other hydraulic systems. They may be used with any kind of drive—belt, chain, gear, or direct—and require a minimum of piping and space. They offer a wide range of standard sizes and controls permitting you to custom-fit Oilgear Systems to the speed, power and function specifications of practically any machine. Speeds are steplessly variable from zero to maximum in either direction; ratios between feed and rapid traverse are high; feed speeds can be controlled with *micrometer* accuracy; reversals are fast, cushioned and controlled; lubrication is automatic with Oilgear Fluid Power Units. Pre-set operating speeds in either direction, remote control by push-button stations and automatic pressure unloading are a few of the advantages of the many different types of Oilgear standard controls.

The superior performance and dependability of Oilgear Fluid Power Systems have proved out on the toughest defense schedules. From your standpoint and your customers' it is the most economical and efficient answer to the power problems of your machines. Complete technical data is yours for the asking. Just indicate on the coupon whether you want information about Oilgear Pumps, Motors, Transmissions, Cylinders, Valves, or all of them. THE OILGEAR COMPANY, 1309 West Bruce Street, Milwaukee, Wisconsin.

Feeds • Pumps • Cylinders • Valves • Motors • Transmissions
Horizontal and Vertical Broaching Machines • Horizontal and Vertical Presses • Custom Built Machines

OILGEAR

Trademark Reg. OILGEAR U. S. Pat. Off.

THE MOST EFFECTIVE APPLICATION OF fluid power

THE OILGEAR COMPANY, 1309 W. Bruce St., Milwaukee, Wisconsin
Please send information about ☐ Pumps and Motors, ☐ Transmissions, ☐ Cylinders, ☐ Valves.

Name .....

Company .....

Address .....

City ..... *State* .....

Washington . .

• OPA wants prices obtained at bankruptcy sales held within the established maximums but courts are required to confirm sales to the highest bidders . . . Decision awaited on sale at Cleveland where $20,000 in excess of government prices has been impounded.

WASHINGTON — Do OPA's ceiling prices apply to bankruptcy sales?

Price Administrator Leon Henderson says they do. Counsel for trustees say they do not. Mr. Henderson wants prices bid at auction sales to be held within the maximums OPA fixes. He argues that the Bankrupt Court, as a court of equity, "in the exercise of its broad equitable jurisdiction should give effect to the public interest in the prevention of inflation." Against this argument based on a purely economic code by a government body set up by executive order and of doubtful legal status, counsel for trustees assert that under the bankruptcy act courts are required to confirm sales to the highest bidders.

This conflict between Mr. Henderson's OPA and trustees has risen in two bankruptcy cases.

IN one case the auction involved the sale of second-hand machine tools. The other case concerned the sale of second-hand machine tools and metal scrap in excess of OPA's ceiling prices. While OPA interjected itself in both bankruptcy cases, the first one, that of Clyde Riggs, trading as the Pennsylvania Institute of Technology, is no longer at issue. The proceedings held at Philadelphia in the Federal District Court for the Eastern District of Pennsylvania did not require a decision, as it happens, because in no case were bids above OPA's prices.

The second case, however, awaits decision and involves sales made above OPA's ceiling prices. Not only that, but $20,000, representing funds in excess of the government prices, has been impounded awaiting the decision to see whether they should be returned to the bidders. This proceeding held at Cleveland in the Federal District Court, is that of the Bender Body Co.

When application for confirmation of the sales came before Referee William B. Woods, objection was made by OPA Assistant General Counsel Brunson Mac Chesney to sales in excess of price ceilings. It was stated that products sold at the trustee's sales at prices in excess of OPA ceilings were essential to the defense effort. In order that such goods might be immediately utilized for defense production, Mr. Mac Chesney entered into a stipulation with Paul C. Clarke, Cleveland, attorney for the trustee, to the effect that the sale be confirmed by the referee.

THIS stipulation was made with the provision that the confirmation should in no way prejudice the rights of either the Administration or the trustee to assert or oppose the applicability of the price schedule to the sale nor the right of the trustee to interpose objections to the motion of the Administrator to intervene.

It was further provided that if it should be determined that the price schedules are applicable to the trustee's sale the excess paid above price ceilings would be refunded to the bidders at the sale. To this end it was agreed that a fund of $20,000 would be segregated by the trustee from the other assets in the estate to apply on the refunds, if any.

OPA is now preparing a supplemental brief to be submitted to the referee and Mr. Clarke. This will be the last step before a decision in this interesting case respecting the right or the lack of the right of OPA to be a czar over prices under all conditions in the name of national defense, and in the face of a law that is cited to counter OPA's contention.

GUNS FOR U. S. MERCHANT FLEET: Soon sailors in the merchant marine will hear the call, "Man the Guns." This is one of the guns being installed on the stern deck of a merchant ship for submarine and aircraft protection, in accordance with the recent decision of Congress to "deliver the goods."

MAKE SUNOCO YOUR PARTNER *in* PRODUCTION

Take a Step Toward Setting a HIGHER P-Q*

Production . . . and still greater production . . . with no limit on quantity —no let-up in quality . . . that's the order of the day!

And leading manufacturers are relying on the high lubricating and heat absorbing qualities of Sunoco Emulsifying Cutting Oil to help their hard-pressed machine tools meet this demand. They know how Sunoco rapidly dissipates the heat . . . carries away chips . . . permits faster removal of metal . . . helps to prolong tool life and cuts "down time" for tool regrinding and resetting. They know, too, how Sunoco aids in maintaining close tolerances . . . improving finishes . . . and reducing rejects. This makes possible precision production at rated capacity-plus . . . and permits the setting of a higher Production Quota (P-Q*).

Put Sunoco to the test in your own plant, under your own operating conditions. See how labor, equipment and the right cutting lubricant, all working for maximum efficiency, make possible the setting of a new, higher P-Q*. Write or wire:

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PERFORMANCE DATA

OPERATION — Taper Turn Locomotive Frame Bolt
MACHINE — Warner and Swasey 1-A Universal Turret Lathe
MATERIAL — S.A.E. 3140 Steel
SPINDLE SPEED — 398 R.P.M.
CUTTING SPEED — 208 S.F.P.M.
FEED — .020 inch
DEPTH OF CUT — 1/8 inch to 1/4 inch
CUTTING LUBRICANT — 1 part Sunoco to 20 parts water

Photo Courtesy of
THE WARNER & SWASEY CO.

OPERATOR + MACHINE + RIGHT CUTTING OIL = P-Q* PRODUCTION QUOTA

SUN OILS

PETROLEUM PRODUCTS FOR ALL INDUSTRIES

THEY TALK OF COAL: B. F. Fairless, Dr. J. R. Steelman, and John L. Lewis, the three-man arbitration board created by the President to seek settlement of the captive coal mine dispute, met last week in New York.

NAM Strongly Against Compulsory Arbitration

Washington

• • • **The National Association** of Manufacturers is strongly opposed to the adoption by Congress of compulsory governmental arbitration in labor disputes, Charles R. Hook, president, American Rolling Mill Co., said last week on behalf of NAM while testifying before the House Committee on Labor.

Commenting on such a proposal Mr. Hook said, "Compulsory arbitration results in settlements imposed by outsiders. Awards resulting from forced arbitration rarely, if ever, obtain that degree of acceptance necessary to re-establish or maintain harmonious conditions of employment."

"The functions and responsibilities of management and labor," he added, "are usurped by temporary arbitrators who have no responsibility for the effect their awards may have on productive efficiency or plant conditions."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Machinery Exports Drop 18% in September

Washington

• • • **Totaling** $34,250,644, United States exports of industrial machinery in September showed an 18 per cent decline from the high figure of $41,976,614 reached in August, according to the Department of Commerce. Practically all the export classes shared in the decline, with only textile, sewing, and shoe machinery showing any notable gain.

Exports of machine tools amounted to $14,274,854 in September, a decrease of more than 16 per cent from the August total of $17,124,324. Exports of lathes dropped to $3,511,262 from $3,544,183 in August; milling machines to $3,365,716 from $4,151,690, and grinding machines to $2,090,655 from $2,399,030. Foreign sales of drilling machines totaled $720,228 in September, less than half the August shipments of $1,629,846. Metal-working machinery other than machine tools also recorded decreased exports in September, amounting to $2,304,092 compared with $3,574,584 in August.

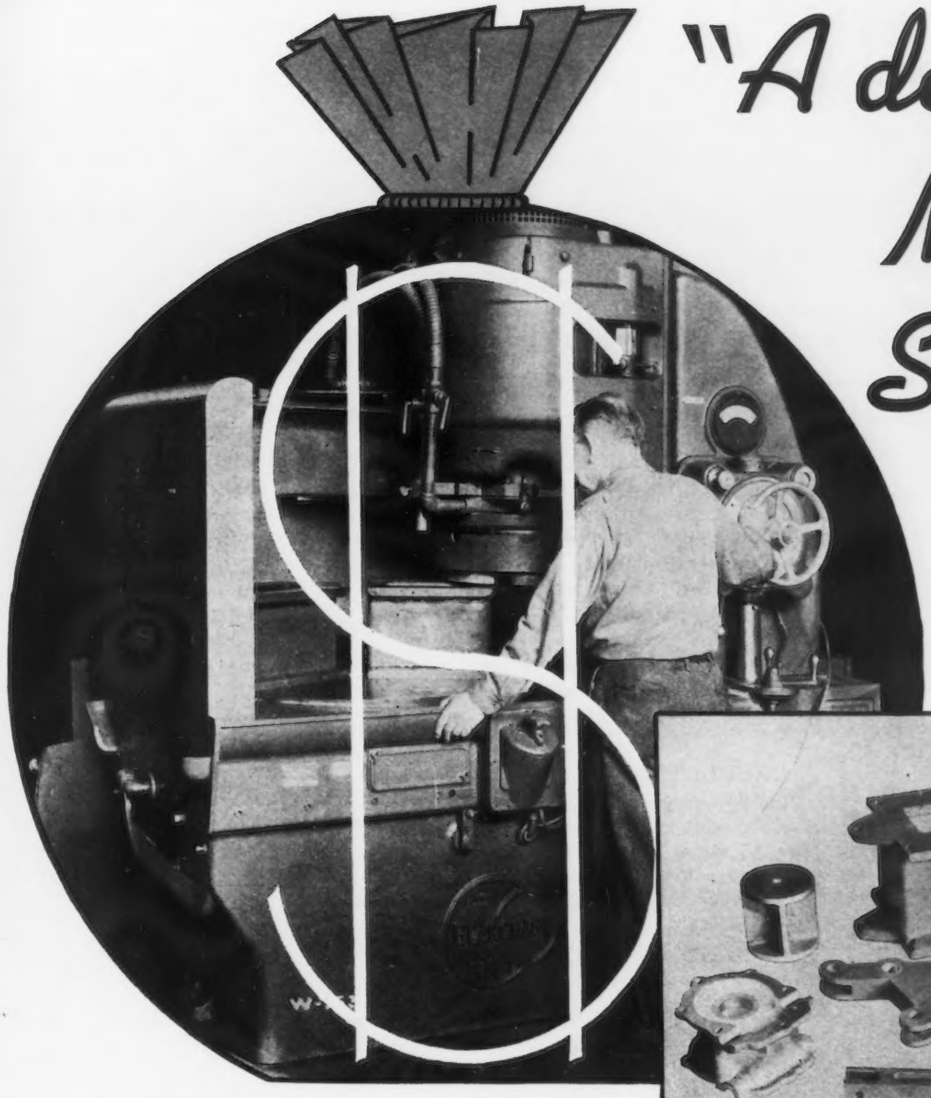
Shipments of rolling mill equipment totaled $726,645 in September as against $543,558 in August, forging machinery was down to $401,395 from $979,475, while sheet and plate metal-working machinery registered the largest drop to $704,008 from $1,558,422.

Directs Chicago OPA Office

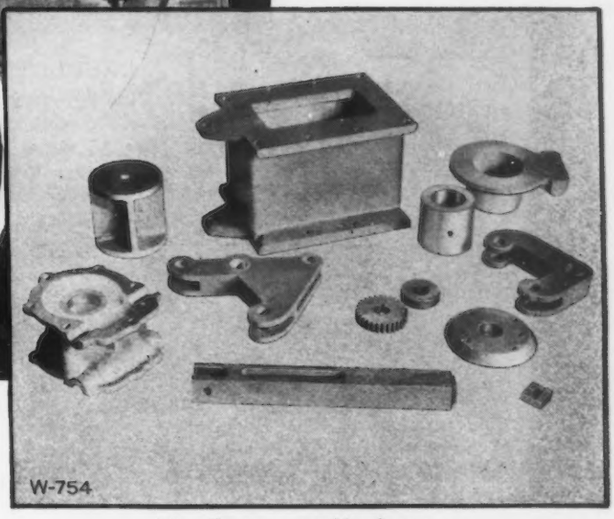
Washington

• • • **John C. Weigel** has been appointed director of a regional office being opened in the Civic Opera building, Chicago, by OPA. Mr. Weigel was formerly on the executive staff of Sears, Roebuck & Co.

"A decided Money Saver"



No. 18 Blanchard with 6" extended column for work 18" maximum height.



Miscellaneous parts like these are a "natural" for Blanchard Grinders.

Routing miscellaneous parts in small quantities is a problem in any plant—until they come to Blanchard Surface Grinders. "A decided money saver" is what the manufacturer of these pump parts called his No. 18 Blanchard. This is a machine designed not only for production, accuracy, and fine finish, but for quick changeover from job to job. Chucking the work is made easy by the Blanchard One-Piece Steel Magnetic Chuck. Convenient controls make the setting and operation of the machine quick and almost effortless. If you decide to put a "money saver" in your plant, write to Blanchard to find out just what these savings will be.

BLANCHARD

THE BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASSACHUSETTS, U. S. A.

WEST COAST . . .

• Steel circles slightly puzzled by excess pig iron capacity scheduled for Provo, Utah, while the new plant to be built at South San Francisco will have 648,000 tons of open hearth capacity with no corresponding stack facilities.

OLD timers may classify as fit only for the fairy tale department the suggestion that Columbia Steel Co., U. S. Steel subsidiary, might become the principal pig iron supplier for new Bethlehem open hearths at South San Francisco. Nevertheless, it is a mathematical possibility, and figures moving behind the curtains of Washington negotiations insinuate such a possibility.

Announcement last week by the Defense Plant Corp. that its new plant to be operated by Columbia at Provo, Utah, would have four blast furnaces, instead of the two previously announced, plants the seed of suspicion. At the same time the Defense Plant Corp. said the Provo mill would include open hearths with 840,000 tons of ingot capacity annually and a 500,000 ton plate mill previously announced for a Pittsburg, Cal., location. Meanwhile, Columbia Steel Co. has underway its own expansion program at Pittsburg, Cal., enlarging ingot capacity there by 77,000 tons. Thus, new open hearth capacity either operated or owned by Columbia will total about 917,000 tons, while the available pig from the four new Provo blast furnaces will be 1,450,000 tons.

In the Hauck report of Sept. 24 on possible steel expansion it was noted that Bethlehem had proposed a new fully integrated plant at Los Angeles, to be entirely government financed, embodying two blast furnaces with 864,000 tons of pig iron capacity annually and open hearth furnaces with an annual capacity of 648,000 tons of ingots. Among other facilities there were to be coke ovens, two electric furnaces, and finishing mills with an annual capacity of 519,600 tons of widely varied products. The fact that this proposal included coke ovens at Los Angeles caused some comment at the time, inasmuch as the nearest known coking coal deposits are located in either Utah or Washington, several hundred miles away by rail or water. Furthermore, iron ore deposits sufficient to support an operation of this size, although probably existing in the relatively near vicinity, are not known to have been explored to the extent that such a large investment could be immediately approved.

SPECULATION on possible ore and coking coal sources for this Los Angeles plant was cut short Nov. 11 when Mr. Hauch, speaking at the tête à tête of the OPM and steel companies, stated that the proposed location of this Bethlehem-operated plant had been shifted from Los Angeles to South San Francisco where Bethlehem now operates a mill. The change was made, Mr. Hauch said, at the request of the War Department which had other plans for the Los Angeles area. But the point in Mr. Hauck's statement which may or may not be significant is that he mentioned only open hearth furnaces with 648,000 tons of ingot capacity as being planned for South San Francisco. No reference was made either to the two blast furnaces or the coke ovens which would be equally not-at-home in San Francisco as in southern California.

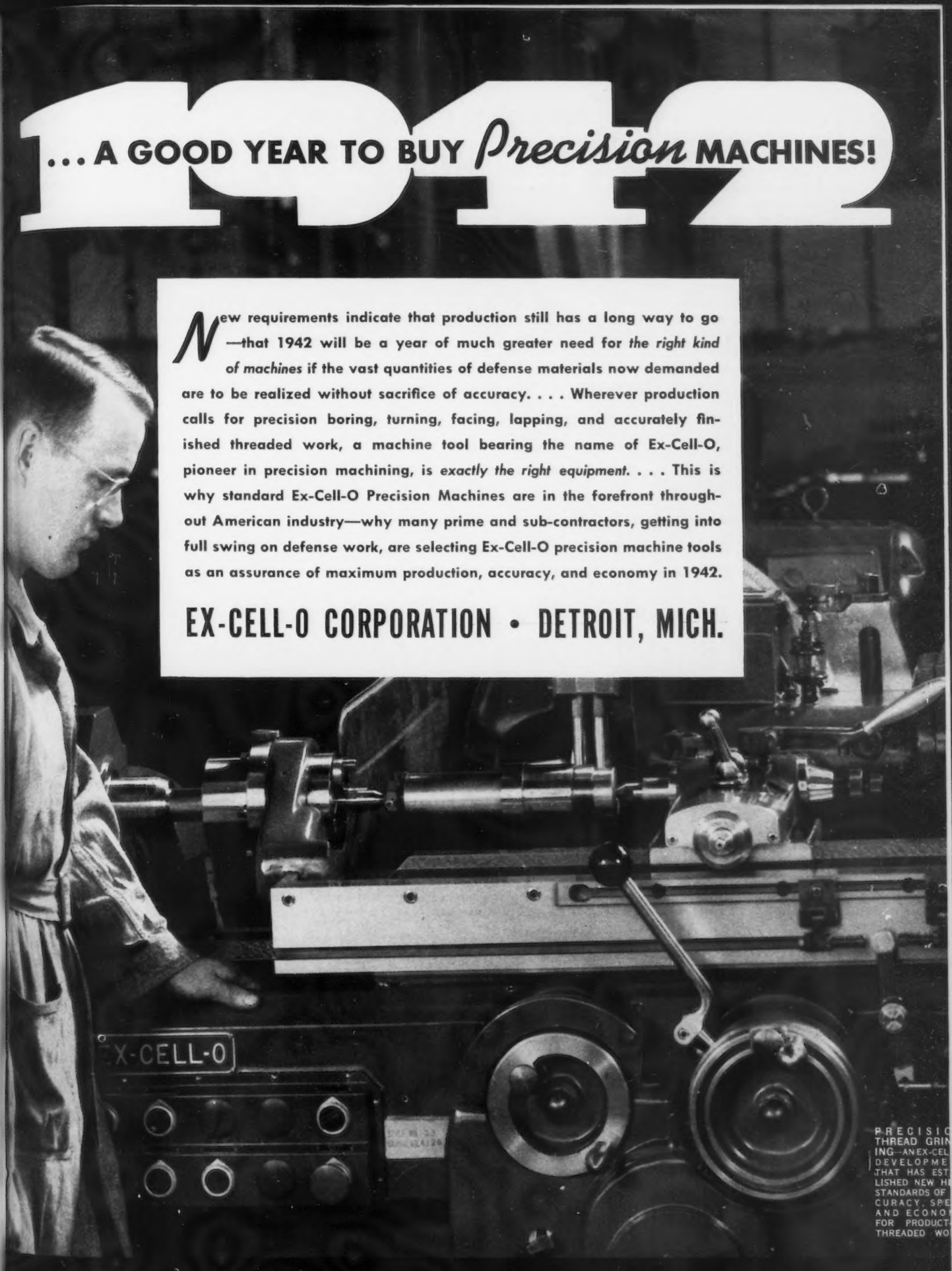
From what has been announced, it would appear the plant which the Defense Plant Corp. would build to be operated by Bethlehem at South San Francisco would have 648,000 tons of open hearth capacity with no corresponding pig iron capacity and that the plant to be operated by Columbia at Provo would have a pig iron capacity of over 500,000 tons in excess of Columbia's new steel capacity. It may be explained, parenthetically, that the single blast furnace now operated by Columbia at Provo supplies pig iron to Columbia mills at Pittsburg, in the San Francisco industrial neighborhood, and Torrance, in southern California, as well as the foundry trade. And it may also be added that with this exception, the Pacific Coast steel industry now runs on scrap.

Now that you have the pieces, you can put together this tessellation anyway you want. It is a cinch that not much more steel capacity can be built on the Coast to operate on scrap alone. In fact, it may be that the extra blast furnace that has been added to the Provo expansion program, and which was never previously mentioned, is an indication that the prospect of obtaining sufficient scrap to maintain present Columbia operations on the Coast is not bright. In this case the OPM and Defense Plant Corp. may have other plans altogether in mind for the Bethlehem South San Francisco program.

THE shifting of the entire government financed Columbia expansion to Provo has several implications. The most obvious is that if the blast furnaces were located at Provo and the open hearths and finishing facilities at Pittsburg as originally planned, pig would have to be remelted. Secondly, Provo serves as a central point from which steel may be shipped to all parts of the Coast on almost equal radii. Third, and not least, from a defense standpoint, the location of a great iron and steel center several hundred miles inland is sound logic. The Provo location has two strong drawbacks, however. A large labor force, probably at least 5000 men will have to be recruited to this isolated town. During the emergency period these men and their families will hang like a Damocles sword over the local economy, plunging down on the local population when the emergency ends. It will be a worry, not only to Columbia but to foundries in the Salt Lake territory to scratch from the desert and agricultural oases sufficient scrap to supply everyone. Even now, the scrap situation there is reported acute.

Lending still more mystery to the possible course of West Coast steel expansions was a report of untraceable parentage appearing in a San Francisco newspaper under a Washington dateline to the effect that "OPM has approved Henry J. Kaiser's plan for making steel on the West Coast it was learned here." If such approval had been

1942 ... A GOOD YEAR TO BUY *Precision* MACHINES!



New requirements indicate that production still has a long way to go—that 1942 will be a year of much greater need for *the right kind of machines* if the vast quantities of defense materials now demanded are to be realized without sacrifice of accuracy. . . . Wherever production calls for precision boring, turning, facing, lapping, and accurately finished threaded work, a machine tool bearing the name of Ex-Cell-O, pioneer in precision machining, is *exactly the right equipment*. . . . This is why standard Ex-Cell-O Precision Machines are in the forefront throughout American industry—why many prime and sub-contractors, getting into full swing on defense work, are selecting Ex-Cell-O precision machine tools as an assurance of maximum production, accuracy, and economy in 1942.

EX-CELL-O CORPORATION • DETROIT, MICH.

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Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DRILL JIG BUSHINGS, PARTS

made, the main Kaiser office in Oakland, Cal., said it had not heard of it. Moreover, if the Kaiser steel plant proposal is accepted as well as the Columbia and Bethlehem plans, the Coast is going to have a lot of steel on hand.

That Uncle Sam's confidence in Mr. Kaiser and his associates was well warranted when it loaned the money to build a magnesium plant using a new process of reduction in Permanente Canyon south of San Francisco is indicated by the fact that expansion is under way from the original capacity of 4,000,000 pounds annually to 24,000,000 pounds. Another Kaiser magnesium plant in the Pacific Northwest, for which Bonneville power was allotted is being held in abeyance.

THE aviation industry news of the week—that Vultee Aircraft, Inc., had purchased stock control of Consolidated Aircraft Corp. from President Reuben Fleet—caused the take-off of a squadron of rumors and "kept 'em flying." The stir caused by the sale in the aircraft industry was similar to what would be felt in the automobile industry if Packard should suddenly announce that it had bought Ford. For instance, Vultee's sales for the first six months of the current fiscal year were somewhat over $8,000,000; Consolidated's were nearly $36,000,000. Vultee had a six months' deficit of $593,488; Consolidated made a profit of $4,260,000. Vultee had a backlog of $155,000,000; Consolidated had a backlog of $755,000,000, larger than any other California manufacturer. Actually the purchase represented an expansion of Aviation Corp., which controls Vultee. Rumors that Major Fleet sold his interest in the company he had nurtured from infancy as a result of government pressure were emphatically denied by him. After the sale, he was emphatic in his declaration of support of American foreign policy. But San Diego, hometown of Consolidated, still has reporters who heard him declare before a luncheon meeting given in honor of Sidney Hillman not many weeks ago that "the Government should stop kicking the aircraft industry around." This was at the time when Consolidated was being badgered by strike threats and Major Fleet was trying to get the Government to bear the cost of demanded wage increases. As this is written, incidentally, money due employees under these increases have not been paid, and the union is again swinging a club to enforce the payment by Dec. 16.

For the historical record, the aircraft industry a year ago, with its many independent factors, could have been compared to the automobile industry of the early '20's. Now, with Lockheed uniting with Vega and Vultee buying Consolidated, the merger period which it took the automobile industry nearly ten years more to reach is already in progress.

As long urged by this column, the OPACS last week revised its scrap iron and steel price schedule to enable the flow of scrap to mills and foundries from the State of Oregon and remote areas within California. With this revision and with an increase in Coast basing point prices on steel making grades, the OPA should encounter much less difficulty in enforcing its ceiling prices. The revision reflects a much better understanding of actual conditions prevailing on the Coast, an understanding which should increase now that the OPA has established a branch office in San Francisco.

Columbia Steel Mill Resumes After Strike

San Francisco

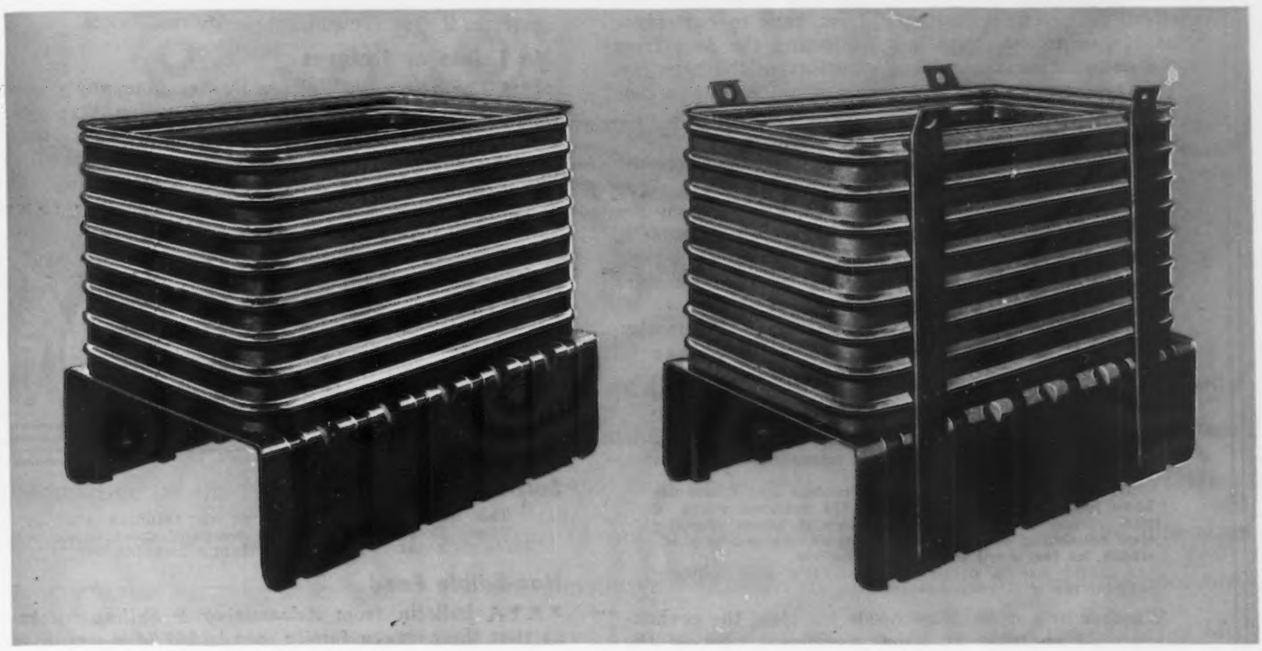
• • • **Columbia Steel Co.'s** Pittsburg, Cal., mill resumed normal operations last Thursday following a "stop and go" strike of 3200 SWOC members. The strike was conducted on an on-and-off basis for over a week as workers sought to escape penalty under a contract provision which went into effect if they were away from the plant for more than 48 hours at a stretch.

Purely a wage dispute, originating in the foundry department, negotiations are under way to effect a final settlement.

FLYING DEATH: These American and British Fighter planes that coped with German bombing attacks on England and North Africa recently were displayed at La Guardia Airport, New York City.

A New Word to Add to Your Industrial Dictionary

TRUSCONVEY



and here's what it means to you

More efficient storage of parts and materials, at strategic points throughout your plant!

More efficient movement and delivery of this material to production lines!

You secure these cost-reducing advantages when you use Truscon Steel Boxes and Skid Platforms to TRUS*CONVEY* anything that involves moving operations in your plant. These sturdy, long-lasting Truscon units are designed to meet the particular requirements of each individual material handling job. They can solve a wide variety of handling problems, simplifying operations, speeding production, encouraging profits.

Learn to say TRUS*CONVEY*—learn the many benefits you will receive from Truscon Steel Boxes and Skid Platforms—let us study handling conditions in your plant and make well-planned recommendations without obligation. Write us today.

Investigate TRUSCON Foundry Flasks

Light weight . . . durability . . . strength where strength is needed . . . easily rammed and shaken out . . . these are features of economy and production you get in TRUSCON foundry flasks.

Write for descriptive literature on complete line.

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YOU'LL FIND IT WILL PAY TO TRUSCONVEY YOUR PLANT MATERIALS

Fatigue Cracks

BY A. H. DIX

Shot in the Dark

• • • At the end of every war this country looks upon its warriors and their works with the same air of polite disdain with which the ex-stenographer who married the boss regards shorthand books and Underwoods. So every time there is a new war we have to start virtually from scratch.

This is probably cheaper than paying a heavy stand-by charge between wars, but it entails a tremendous starting torque. We are not thinking so much of the effort in switching industry from cars to cartridges as of the psychological lag in ejecting the dove from the national mass mind and substituting the blue jay. This necessary change has nothing to do with a conscious desire for peace or for war, but concerns a subconscious adjustment to an altered situation.

No one will ring a bell when the halfway mark in the metamorphosis has been reached, but we detect signs that it has been reached and passed, among them the fact that our favorite automotive press agent, Pontiac's, is now getting a military flavor into his press releases. In a list of rules for safe driving he includes this, "Invade crossings cautiously."

Another straw in the wind is this bit of philosophy from our Detroit editor, William Francis Sherman:

> Like bed and board, kith and kin, and bread and butter, the expression "shot and shell" has been used so often that the words are wedded. We use them without thinking what they mean, and I for one was uninitiate enough to think that shot went out of the picture when cannon balls were outmoded—at least I thought so until today.
>
> But now I am set right. Oldsmobile and Chevrolet have just received an order for $35 millions worth of shot. Upon inquiry I find that this is armor-piercing shot consisting of solid projectiles, as opposed to shell, which, as the word implies, are hollow.
>
> I could use a primer on ballistics and military science for a Christmas present.

Whether or not St. Nick heeds his plea, the prehensile-minded recorder of every significant beat of the national arsenal's heart will soon be an authority on ordnance. But we think the last sentence of his second paragraph is enough to cause an artilleryman to kick his range finder in the azimuth. This is a private argument between Sherman and us and we are not going to spoil it by getting advice from anyone who knows what he is talking about. According to a picture on page 623 of our drugstore dictionary, projectiles are not necessarily solid, and they are not opposed to shell. The shell is part of the projectile. The fuse, shell, shot and powder make the projectile. If our dictionary is wrong we will apologize next week.

We Got It By Pony Express

• • • The head of one of the big California aircraft companies wrote us a letter the Tuesday before last and we got it the following Monday, six days later. There wasn't anything urgent about the letter. He simply told us that he is having your favorite family journal routed over his desk, but we got to wondering why the aircraft people don't send all their letters to the East by air mail, to encourage a struggling industry with a 7.9 billion dollar backlog.

New Scrap Report Blanks Ready

> As you know, if you buy scrap, deal in it, or produce more than 50 tons a month, you are required to file a report monthly with the Bureau of Mines, Pittsburgh. We have emergency blanks available—PD-149 for scrap producers, PD-150 for scrap consumers, and PD-151 for dealers. If you need any, send us some stamps and we'll send you the blanks—10c each for the first three, a nickel each for extras.

Making with the Hands

• • • We read a book recently on the beginnings of speech and learned that the ability to convey information without the use of gestures, facial contortions, and grunts and groans is of comparatively recent origin. But apparently they still help considerably in getting ideas over, as instance this exchange at a priorities clinic held by the American Institute of Steel Construction. We quote from the minutes:

Question: *P-22 doesn't cover the steel industry.*
Colonel Coneybear (of the OPM): *No, sir.*
Question: *Where do they come in?*
Colonel Coneybear: *It does.*

In cold print this looks like double talk, but with gestures, it was probably perfectly intelligible.

He Thinks in Pictures

• • • The editor of Wallace Barnes Company's house magazine, *The Mainspring*, a publication that deals seriously and sapiently with spring design, is blessed with an artist whose gift for picturizing points of design and physical properties amounts to genius. The temptation to pass along a few in the latest issue was too strong to resist:

Bolt from the Blue

> The first one above set us to thinking that a brilliant slogan for a finance company specializing in loans to aviators would be "Happy Lending."

Non-Edible Food

• • • A bulletin from *Advertising & Selling* informs us that the average family spends $37.34 a month for food. The biggest item is meat, $9.67; next is dairy products, $9.46, and so on down to "non-edible items, $1.75." Ever since we read the bulletin we have been trying to think of a non-edible food, but so far we haven't been able to conceive of anything but cocoanut shells, and maybe turnips.

Puzzles

Each side of last week's triangle is .770 yd. long and the area is 2.31 sq. yds.

This is from I. A. J. Duff of London:

> *"I always follow your mathematics with some enjoyment, although your puzzles are uneven and you don't always play fair! E.g., your Sept. 18 long division sum, with only the sevens showing. You don't say that all the sevens are shown, but you certainly imply it . . .*
>
> *Sorry to reopen what must be as dead as a dodo to you, but Herr Schickelgruber delays the papers quite a lot!*

The problem is as fresh in our mind as if it were only yesterday. We ran it just as it appeared in our puzzle book and whatever unfairness there was, was the puzzle book's, not ours. We have striven for fairness at all costs, and have never to the best of our knowledge run a problem that was tricky, although it has taken all our will power to keep this gem from your eyes:

> *How much dirt in a cylindrical hole, dug in the ground to the depth of one inch, and one inch in diameter?*

The answer is of course, that there is no dirt in a hole. What we suspect is that we need a new puzzle book. We are beginning to get the idea that ours is a bit out of date, for one of the problems in it has to do with an airplane that flies 90 miles an hour. But as the speed of rowboats is constant, this one is still good:

> *A and B are each in a rowboat. Each boat is connected to a pier by a rope 50 ft. long. A's rope is tied to the pier, while B's rope is held by C, who stands on the pier. To get back to the pier, A and B each pull hand over hand with equal force. C also pulls. Who reaches the pier first, A or B?*

Practical Helps for Heat Treaters

1 Furnaces for Armament is packed with facts and practical information on the types of heat treating equipment best suited to production of cartridge cases, gun mounts, clips and links, tank parts and other government work. It is practical, helpful and factual because the Lindberg organization, its publishers, is a thoroughly practical group with a vast background of practical experience gained in the world's largest commercial heat treating plant. If you are planning on government contract or sub-contract work, whether it's the heat treatment of aluminum fuselage sections, the nitriding of tank parts, or the production of 20 mm. cartridge cases, a copy of FURNACES FOR ARMAMENT should be on your desk.

2 Heat Treating Hints goes into its third year of publication with wide and enthusiastic acceptance of over 8000 heat treaters and metallurgists throughout the country. The publication is unique in that it puts onto paper the actual shop methods of experienced heat treaters. All articles, whether on straightening, types of tongs to use for high speed parts, or the ageing of gages, for example, are strictly "how to do it." It is published without charge for Heat Treaters by Heat Treaters, and your name will be added to the mailing list upon request.

3 Supplementing the publi- cation is the full length sound and color HEAT TREATING HINTS Movie. Scenes in the film show the actual heat treating operations going on, with the editors of Heat Treating Hints in action at their furnaces, quench tanks and straightening presses. The movie contains no advertising. A pamphlet is available giving complete instructions on how to arrange for the showing of the Heat Treating Hints movie at your plant or chapter meeting.

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LINDBERG FURNACES

This Industrial Week . . .

NEW steel demands by Canada and England have been piled on the ever-rising backlog which faces American steel producers. A recent caller in Washington was C. D. Howe, Dominion Minister of Munitions and Supply, who carried in his pocket a request for 2,000,000 tons of steel for Canada.

While many other visitors to Washington, including many non-defense plants which are threatened by priority shutdowns, also are looking for supplies of steel and other metals, few had Mr. Howe's good fortune to be able to say, as he left, that "There is reasonable prospect that the additional supply (two million tons) will be forthcoming."

Government agencies have just completed allocation of more than three-quarters of a million tons of steel to be shipped to England during the first three months of 1942 under Lend-Lease provisions. This steel, which will be provided by 15 companies, includes approximately 210,000 tons of ingots, 270,000 tons of slabs and billets and a balance of 282,000 tons covering rails, shell steel and other products. Some of the 15 steel manufacturers are receiving a greater share of this type of business than heretofore.

Exports of Machine Tools Decline

Exports of industrial machinery from the U. S. for September, the latest reported monthly total, were valued at more than $34 million, a decrease of almost a fifth from the August total. Machine tool exports for September were slightly above $14 million, a 16 per cent decline. Of interest to steel mill equipment manufacturers is the announcement of the placing by a Brazilian purchasing commission of orders for open hearth furnaces and rolling mill equipment for the Brazilian National Steel Co. plant. Plans for constructing a plant to build military aircraft engines near Rio de Janeiro have reached an advance stage.

As the pressure for war equipment from democratic countries in all parts of the world continues to complicate the problem of building national defense, further reports on the efficiency of American-made equipment under fire begin to trickle in. Success of U. S.-built tanks in the Libyan campaign has demonstrated the potential weight which U. S. industry can exert in this war. In view of the praise which has privately and publicly been given the medium tanks used in fighting in North Africa, some observers believe that the improved models of the M-3 tanks (first photos appear elsewhere in this issue of THE IRON AGE) will be the most efficient land-fighting units yet developed.

New Tanks Will Be World's Best

In the new M-3, U. S. technicians have overcome such difficult tasks as the development of one-piece cast steel hulls and turrets which simplify production problems, resist projectiles at least as well as other types, and eliminate the danger of flying rivets. In addition to stepping up production of the tank, which Lord Beaverbrook says is the "most terrible" weapon of the war, to a goal of 3000 units a month next year, the Army has announced its plans to eliminate riveted structures from its tanks and to utilize welded sections and one-piece castings.

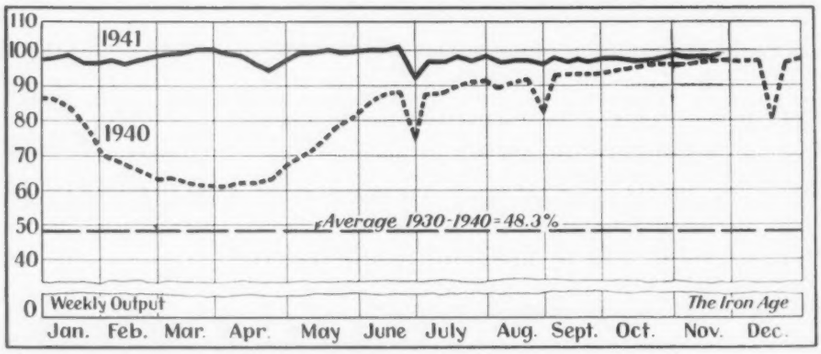
A partial solution to the priorities unemployment problem facing Detroit may come from efforts to develop an automobile type engine to replace the present aircraft type engine used to power tanks.

Direct Allocation for Steel Plates

In a step which will be closely watched because of its importance to the whole material distribution system, the OPM has finally formalized the direct allocation system for steel plates in an order from SPAB Priorities Director Donald M. Nelson. Defense demands for plates for the Army, Navy and Maritime Commission are already taking half the existing capacity of 600,000 tons a month. Other leading users are tank, railroad car and pipe manufacturers. Recent reports from plate producers show defense and essential civilian orders with rating of A-10 or higher totaling 850,000 tons for shipment in a single month.

Mr. Nelson's new plate order rules that after Dec. 1 no person shall produce, deliver or accept plates except in accordance with instructions from the director of priorities. Producers are required to file with the OPM Iron and Steel Branch by the 15th of each month a schedule of production, shipments and unfilled orders for the following month. Plates produced in excess of schedule cannot be disposed of except at the direction of

Steel Ingot Production—Per Cent of Capacity
(Open Hearth, Bessemer and Electric Ingots)



Steel Ingot Production, by Districts—Per Cent of Capacity

	Pitts-burgh	Chi-cago	Val-leys	Phila-delphia	Cleve-land	Buf-falo	Wheel-ing	De-troit	South-ern	S.Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week.....	99.0	100.0	96.0	90.5	96.0	90.0	93.0	105.0	95.5	100.0	97.0	102.0	100.0	97.0
Previous Week....	96.0	99.5	89.0	92.0	95.0	90.0	92.0	112.5	95.5	100.0	96.0	105.5	109.0	95.5

the director of priorities who will make such changes in the proposed shipments of each plate manufacturer "as seem appropriate."

Back Seat for Other Consumers

Prospects that steel plate capacity will be concentrated on naval and Maritime material suggest that other plate consumers with priorities will have to take a back seat for many weeks to come.

Despite the growing severity of the pig iron and scrap shortages, steel ingot production this week is estimated at 97 per cent of capacity, an advance of 1½ points from last week, the gain representing a further resumption in capacity shut down because of the coal strike. This week's ingot rate is the same as two weeks ago but a full point below the rate of a month ago.

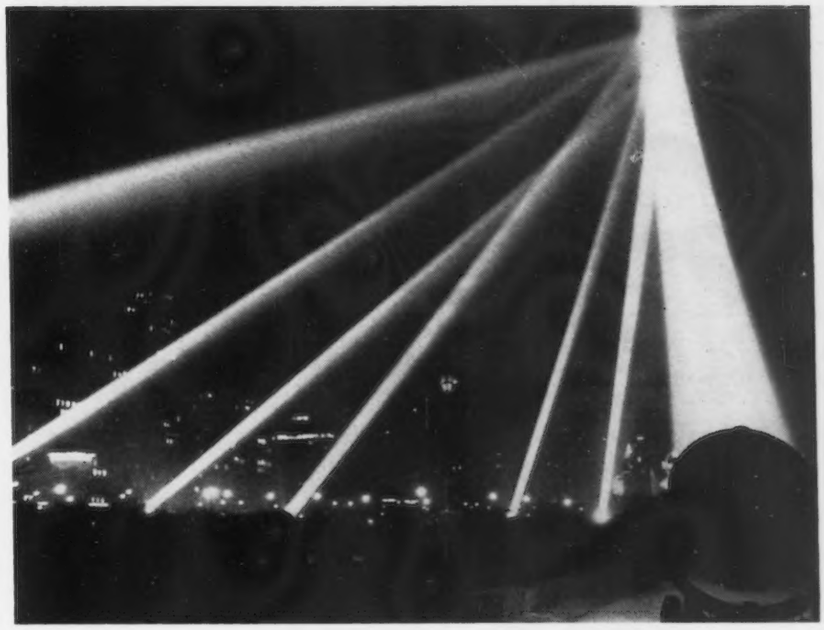
The Pittsburgh district steel rate is up 3 points to 99 per cent, Chicago up ½ point to 100, Youngstown 7 higher at 96, Wheeling up one to 93, Cleveland a point higher at 96, and the Western rate up a point to 97. The Eastern Pennsylvania steel operating rate is off 1½ points to 90½ and Detroit is 7½ points lower at 105, while the St. Louis rate is off three to 102.

Ingot Rates in 3 Districts Unchanged

The Buffalo, Birmingham and Southern Ohio River operating rates were unchanged at midweek.

Meanwhile the lack of pig iron is fast becoming as important as the scrap shortage in restraining steel-making operations, particularly in the East and in Southern Ohio.

The temptation to keep defense production going and avoid layoffs by paying more than the maximum government prices for scrap, either directly or through relaxing of grading, is proving irresistible on an increasing scale in both steel mill and foundry grades. Violations are most frequent where the greatest shortages exist, as on the West Coast where premiums as high as $15 a ton over the established ceilings are reported. The OPA, and scrap buyers and sellers are giving much thought to methods of correcting the price structure, the dealers urging that prices be based on the most advantageous basing point instead of the nearest basing point. Dealers have also proposed a separate schedule of cast iron prices quoted f.o.b. shipping point, the standardization of only one blast furnace grade and a change on scrap bundles.



ENEMY ALOFT: Army searchlight equipment at Fort Sheridan was tested by the 210th Coastal Artillery, lighting up the night skies of the Chicago lake front.

Steel bookings during the last week of November slipped below the corresponding period of October in some areas, notably Pittsburgh, but production and shipments still are well behind the incoming flow of new business. For the 11 months ended Nov. 30, new bookings in Eastern Pennsylvania are estimated to be 50 to 55 per cent higher than for all of 1940, with May and June of this year showing the greatest tonnages booked and November closely trailing these two months. New orders of interest during the past week are for steel ammunition boxes, requiring alloy strip, and the awarding of an experimental order for sheet disks to be used in the stamping of steel shell casings. Crane builders are heavily loaded with orders for their equipment at defense plants and shipyards while demand for steel wheels has become so heavy that one of the nation's leading producers has a 7-month backlog.

Railroad Workers' Strike Averted

Labor developments this week included settling of the threatened country-wide railroad strike with a pay increase of 9½ to 10 cents an hour, and a declaration by the National Association of Manufacturers that major defense strikes in the last five weeks have cost workers $10,200,000 and the defense program a total of 10,313,-864 man-hours of production.

Steel industry payrolls reached a new peak during October, totaling $118,890,000 and averaging 98.3c. an hour for 646,000 employees. There were 6000 fewer steel workers in October than in September.

Structural steel lettings last week declined to 14,350 tons from 27,500 tons, the largest award being 3500 tons for a plant expansion for Copperweld Steel Co., Warren, Ohio. New structural projects of 14,650 tons are slightly higher and include 4000 tons for shafts and tunnels at Governors Island, New York, for the New York Tunnel Authority.

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News of Industry . .

CANADIAN MODEL: This new M-3 Canadian cruiser tank features the latest development in tank construction—cast steel hulls and turrets. The one-piece 10-ton cast armor hull is said to provide greater protection to the crew. New U. S. M-3A1 medium tank is shown on next page.

Welds to Replace Rivets as U. S. Tank Program Expands

• • • **Complete elimination** of riveted construction on all combat vehicles and the development of automotive-type engines for propelling tanks was disclosed over the week end as two developments likely to give United States combat tanks superiority over all other foreign types now in production.

Disclosure of these developments seemed to echo the remarks of Lord Beaverbrook, British Minister of Supply, who on Sunday said "Aircraft cannot win the battle alone. Tanks might. Certainly aircraft cannot. Tanks and aircraft together is the form in which we want to fight. Tanks have been the most formidable weapon in this war—a terrible weapon."

Beaverbrook's statement that the Allies must produce 30,000 tanks a year beginning next July if the Axis was to be defeated, followed by two days the Washington announcement that the goal of tank production in this country had been raised to 3000 a month, a goal which is expected to be reached early in 1942.

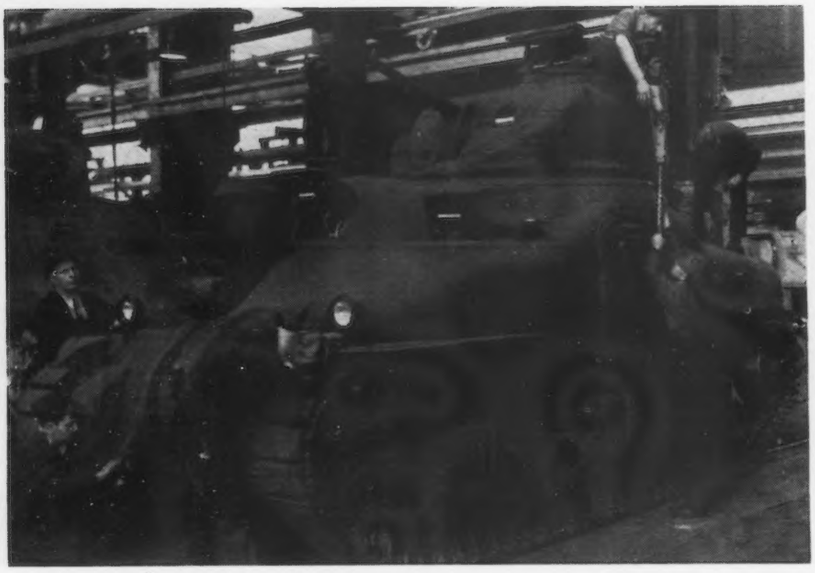
Despite this new emphasis on tanks, priorities granted for tanks are still below aircraft and ships. Aircraft parts have been given a rating of A-1-b by OPM, while light tanks are rated A-1-f and medum tanks A-1-d. Material for merchant ships to be built next year is given a rating of A-1-b.

The conversion of hulls and turrets from riveted construction to cast steel structures was revealed in an announcement by the War Department that the Defense Plant Corp. had entered into commitments totaling $53,500,000 for construction of facilities for producing homogeneous cast armor.

Coinciding with this announcement, was the report by American Locomotive Co. that redesigning of its M-3 medium tank had been completed and a pilot model of the new version, which incorporates for the first time a cast steel hull, will be delivered shortly to the Army. Line production of the new tank, called the M-3A1, is scheduled to begin within a few weeks at the company's Schenectady works.

Reports from Detroit indicated that the redesigning of the Chrysler M-3 tank is progressing rapidly and the new model (to be called the M-4) will be in production in the spring. The new Chrysler tank is expected to have a cast upper and lower hull and a cast turret. The turret will revolve through 360 deg. and is understood to be power driven. The M-4 will probably carry a 75 mm. cannon as its main armament, as does its present counterpart.

Authoritative reports from Detroit indicate that several important automobile manufacturers are endeavoring to perfect an automotive type engine to power tanks to replace the aircraft radial engines (rated at 450 hp.) which are standard use at present.



U. S. MODEL: New M-3A1 tank, U. S. counterpart of the Canadian tank shown on preceding page, also sports a cast steel one-piece hull and turret. This machine, made by American Locomotive Co., carries the 75 mm. cannon in same position as earlier models.

That the use of aircraft engines for tank propulsion has long been considered largely an expedient by military experts has been an open secret for some time. This feeling has not been a reflection on the engine, but rather on the fact that the engine was unsuited by nature for the duties of propelling tanks. Actually the aircraft engines have stood up far better in tank service than had been expected.

One important drawback of the aircraft type engine is that it is designed primarily for constant speed operation, while in tank operation engine speed is being constantly varied.

Chrysler announced a short time ago that it had designed and expected to submit for tests an arrangement of Chrysler engines for propelling tanks. Unofficial reports indicated that this arrangement consists of five De Soto engines, developing over 100 hp. each. An advantage of this arrangement would be that one engine could be repaired while the tank was in motion.

This idea is somewhat similar to that employed to power the Sea Otter, a 1900-ton cargo boat which is powered by 16 Chrysler engines (see THE IRON AGE, Oct. 2). Chrysler is also developing a single tank engine of 500 hp., but little is known of its design.

The possibility that General Motors might supply motors for the tanks it is building was seen in the report that G-M's diesel division is planning an expansion which will permit it to make 4000 diesel engines a month.

In August of this year, Edsel Ford remarked, to the consternation of Army officials, that the company had developed a 500-hp. V-8 engine for tank use, similar in design to its airplane engine. Since that remark, no further details of the Ford engine have been available.

In the light tanks to be built by Cadillac, the company is expected to make use of two Cadillac engines per tank. In addition, American Car & Foundry is expected to go over to Cadillac powerplants.

Still another company active in this field is the American Locomotive Co., builders of the M-3 tank, who have announced that they are planning to build the first industrial model of a tank with a diesel engine in place of a gasoline engine. However, this will probably be of the radial type.

Particular significance is attached to the prospects of large scale use of automobile type engines for tanks. It will permit utilization of existing facilities, will help stem the tide of priorities unemployment in Detroit and will put the automobile industry to work doing something it already knows how to do.

The conversion of the hulls and turrets of military tanks from riveted units to one piece cast structures has been under study by the Army for some time. The first indication that a cast armor with the required ballistic propertes had been developed and was producible in production quantities was the unveiling, on June 30, of a new M-4 Canadian tank which, according to available photographs, carries a one-piece cast hull and one-piece cast turret. This Canadian tank is produced by the Montreal Locomotive Works, Ltd., a subsidiary of the American Locomotive Co.

Experience with tank warfare in France, Russia and the Far East has indicated that a direct hit on a rivet head, even though it did not penetrate the armor plate, would cause serious damage to the interior of the tank. The force of the explosion often drove the rivets through their holes and sprayed the crews with broken rivets as deadly as shrapnel.

The War Department announcement last week indicated that future tank production would consist of roughly 30 per cent of the cast steel type, with the balance welded construction. The welded type utilizes cast armor plate sections with beveled edges and is welded using a rod of air hardened stainless steel.

The redesigned medium tank, the M-3A1, differs only slightly from its predecessor, according to the American Locomotive Co. The advantages of the cast hull were listed as deflecting shells better than the riveted construction due to its rounded contours, increased speed of assembly and reduced machining requirements. The new M-3A1 will have the same armament as the M-3, that is a 75 mm. cannon, a 37 mm. cannon and a number of smaller machine guns. While no details of the armament of the new Canadian tank are available, the photograph published here suggests that the main armament of this model is a 37 mm. gun, as compared with a 75 mm. on its American counterpart.

The changeover from the riveted to the cast and welded types will

be gradual, according to the War Department's statement. The department emphasized that no orders have been issued canceling production of tanks where riveting is used. This program, it was said, will be fully carried out.

The commitments for cast armor facilities completed by DPC are: American Steel Foundry Co., East Chicago, Ind., for the construction of a special armor steel cast foundry:

General Steel Castings Corp., Granite City, Ill., for the construction of a new plant to make armored steel tank hulls and turrets;

Continental Roll & Steel Foundry Co., East Chicago, Ind., for the construction of a new plant at East Chicago, Ind., for the expansion of three existing plants for the production of hulls and turrets;

Scullin Steel Corp., St. Louis, Mo., for armored castings;

Symington-Gould Corp., Rochester, N. Y., for armored castings.

Negotiations for other facilities have been in progress and announcements of their completion will be made shortly.

The War Department reported that cast hulls are now being made in considerable quantities for the medium tank and that this type of hull is being used increasingly.

The development of the cast armor plate and the use of welding, the War Department said, puts American tank construction far in advance of any such construction known. The methods were declared to have been developed as the result of many experiments on light tanks. In the development of medium tanks, several manufacturers, it was stated, already are casting the hull and one manufacturer is welding.

CHINA'S LIFELINE: Supplies of U. S. war materials are shipped by truck along the Burma Road, shown here as it twists along the ridges of mountains. Japanese airmen have concentrated their bombing attacks on material being shipped by this route.

New Type Tank

Lansing, Mich.

• • • **A new type of** tank, an eight-wheeled, trackless type of armored weapon equipped with 75 mm. cannon, will be manufactured for the U. S. Army here by Reo Motors, Inc., according to information confirmed by Henry E. Hund, Reo president.

The tank wheels will be individually suspended from the hull or chassis by means of airplane-type shock struts. This suspension is counted on to provide an unusually stable gun platform, permitting greater accuracy of fire from the cannon and other armament. It will travel at high speed, and is said to be capable of turning in its own length at 30 m.p.h.

The tank will be powered by a radial, air-cooled diesel motor, apparently the Guiberson diesel, which is now in production. Seventeen of these tanks have been ordered, with deliveries to be started in 90 to 120 days.

Cadillac to Make Light Tanks

Detroit

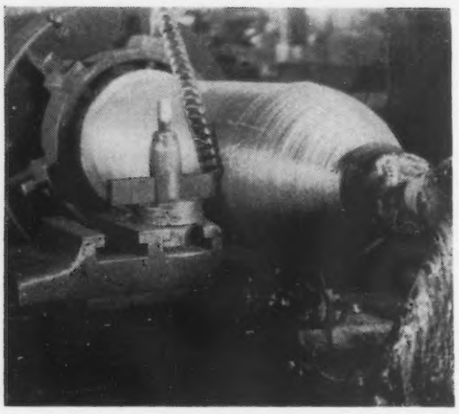
• • • **Within the** auto industry, one of the most interesting bits of news about the rapidly growing tank program is that Cadillac is going ahead rapidly on plans for a major program for constructing light tanks. Still without an order, but not hampered in the least by that fact, Cadillac is marshalling its resources so it probably will be in production on tanks within about six weeks after it gets the go-ahead signal.

The tanks will make use of two Cadillac engines per vehicle, and the total number of engines used for this purpose by Cadillac will be 30,000 if its order reaches the proposed total of 15,000 initially.

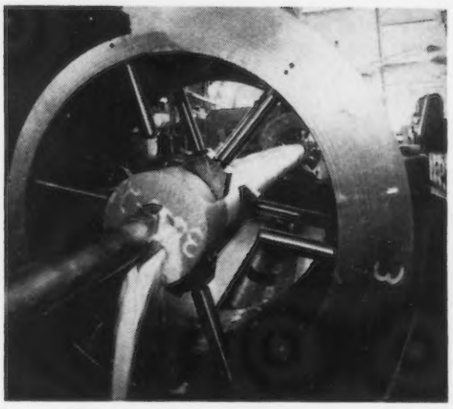
The firm will use a large part of its present machine tool equipment without moving it from its bases in its plants. New tooling will be provided, of course, but it happens that many machine tools in its plants are adaptable to operations on the tanks. Tank production is to take precedence over automotive work, but it will be possible to make autos on a part-time basis, or to switch back to automotive quickly, if desired.

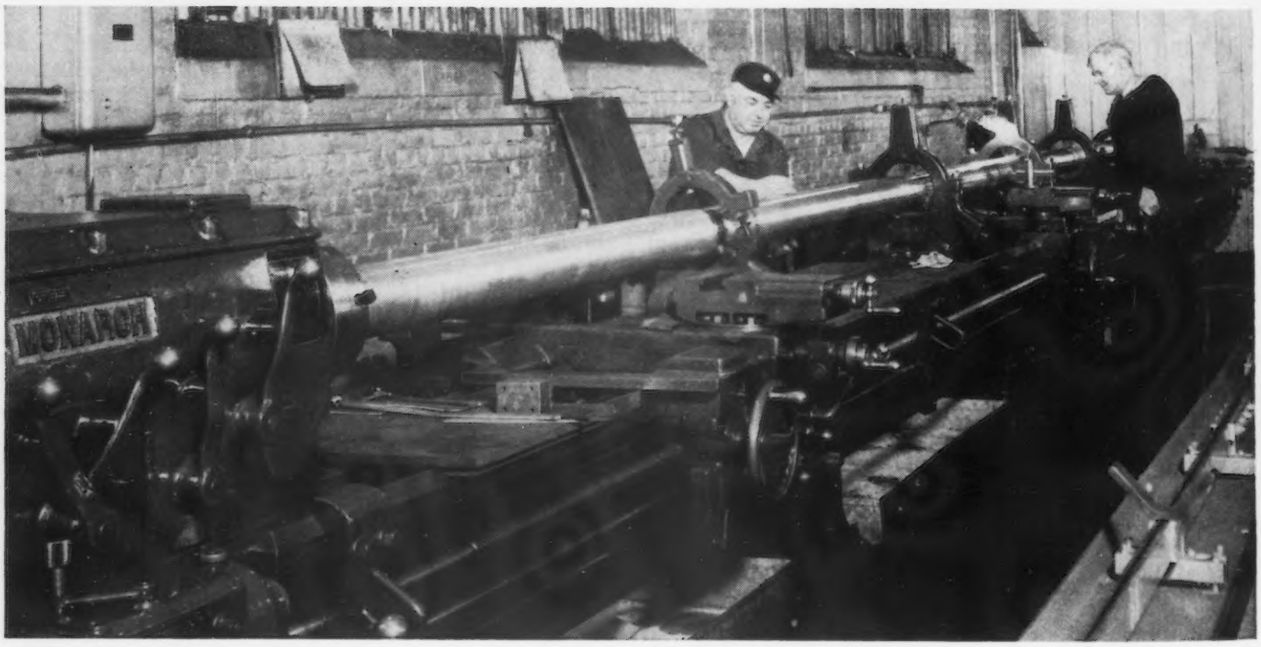
Along with this schedule, possibly Cadillac will build tank engines for four other tank builders, it is said. American Car & Foundry Co. is named as one of these. If this turns out to be true, demand for Cadillac engines may be higher in the next year than ever before in the history of the company. It appears now that the engines will be equipped with the hydramatic drive, pioneered by Oldsmobile and Cadillac. That will greatly increase the demand for these units and should therefore cause a speeding of the tempo in the Detroit Transmission division's plant.

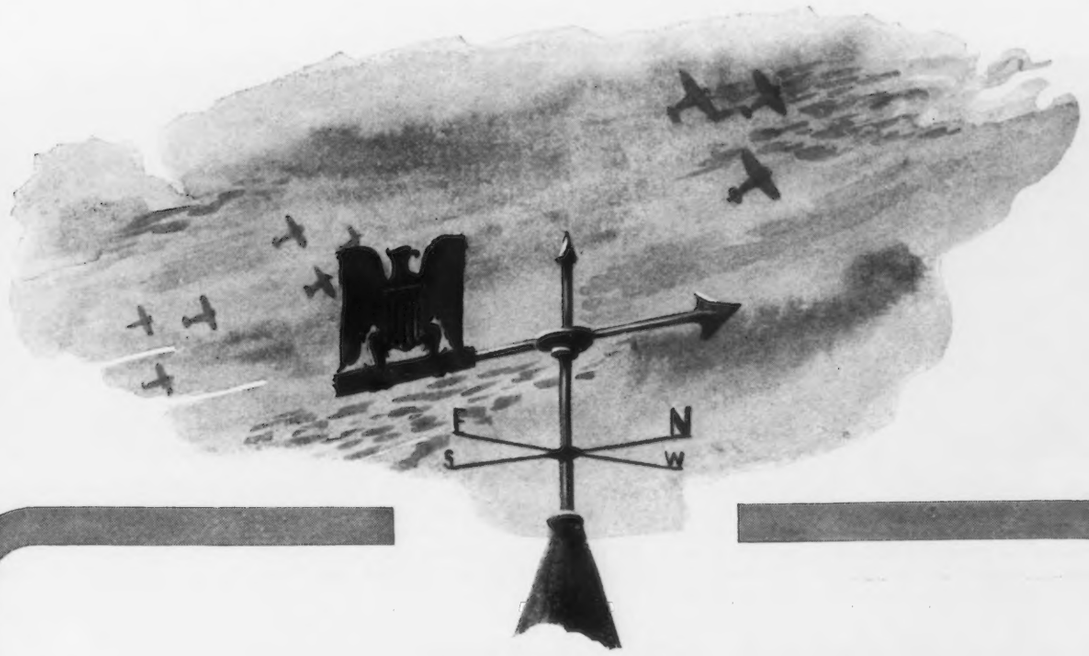
The light tank is said to handle so much like an auto that the ordinary automobile driver would have little trouble driving one of them.



NAVAL ORDNANCE MANUFACTURING AT Crucible Steel Co.'s Atha, N. J. works: Above, section of machine shop. Left, closeup of roughing operations which forms nose of armor-piercing projectiles—in this case for a 16-in. gun. Right, an 8-in. gun, requiring a lathe 145 ft. long, shown in the boring process. Below, a submarine periscope gets a finishing touch.







IN A CHANGING WORLD

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KINGSPORT, TENN.	*Slip-Not Belting Corp.*
LOS ANGELES, CALIF.	*Ducommun Metals & Supply Co.*
MILWAUKEE, WIS.	*Machinery & Welder Corp.*
MOLINE, ILL.	*Machinery & Welder Corp.*
NEW YORK, N. Y.	*H. Boker & Co., Inc.*
OKLAHOMA CITY, OKLA.	*Hart Industrial Supply Co.*
PAMPA, TEXAS	*Hart Industrial Supply Co.*
PITTSBURGH, PA.	*Williams & Co., Inc.*
PORTLAND, OREGON	*Industrial Specialties Co.*
ROCHESTER, N. Y.	*Welding Supply Co.*
SAN FRANCISCO, CALIF.	*Ducommun Metals & Supply Co.*
SEATTLE, WASH.	*H. A. Cheever Co.*
ST. LOUIS, MO.	*Machinery & Welder Corp.*
SYRACUSE, N. Y.	*Welding Supply Co.*
TOLEDO, OHIO	*Williams & Co., Inc.*

R. A. Lewis, general manager of the Bethlehem plant of the Bethlehem Steel Co. is shown addressing several thousand workers gathered in the big No. 2 machine shop during ceremonies preceding the awarding of the Navy E to this plant. Behind him, with head slightly bowed is, J. M. Sylvester, assistant general manager, who acted as master of ceremonies. Left of him is Rear Admiral A. E. Watson, who made the presentation of the Ordnance flag and the Navy E. Farther left is Eugene G. Grace, president of Bethlehem, and Senator James J. Davis, one of the speakers, and R. E. McMath, vice-president of Bethlehem.

OPM Opens Birmingham Office

• • • **The priorities division** of OPM opened a Birmingham office Dec. 1 with Martin J. Lide, of Birmingham, district manager. The office is located in the Phoenix building, 1700 Second Avenue, North. The state office of OPM's division of contract distribution which was opened in the Federal Reserve Bank building, here, several months ago under L. E. Geohegan, area manager, has been moved to the Phoenix building.

Bethlehem Steel Gets Navy E In Colorful Ceremony

Bethlehem, Pa.

• • • **The Bethlehem plant** of the Bethlehem Steel Co. has undertaken to produce more than one-third of the vital parts for the two-ocean fleet being constructed for the U. S. Navy, it was revealed on Nov. 25 when the Navy conferred on this plant and its 25,000 employees the Bureau of Ordnance flag and the Navy E pennant "as a recognition of outstanding effort in the production of ordnance materials vital to national defense."

Following the ceremony, a party of inspection under Rear Admiral A. E. Watson, who made the pennant presentation, saw being forged, machined and heat treated the steel materials for the three basic elements that make up the fighting power in warships—guns and ammunition, armor plate and propulsion machinery. The party saw 5-in. guns being forged for merchant ships and components for the huge 16-in. naval guns being forged and machined; also armor piercing projectiles, torpedo and bomb parts being produced. The inspection trip included a visit to the new $23,000,000 forging plant, just getting into production, which will more than double the heavy forging capacity of Bethlehem.

The visitors stood beside Bethlehem's famous 14,000-ton forging press while an ingot weighing 120

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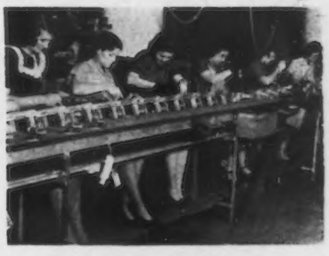

Faster — Smoother Assembly!

LICENSOR

ILLINOIS TOOL WORKS.....Chicago

tons was slowly formed into heavy armor plate. This huge press was installed in 1887 when Bethlehem Steel was called upon by the Navy to be the first producer of armor plate in America. Later the party saw finished armor plate going into the gun turrets being assembled for the battleship *Massachusetts* recently launched by Bethlehem's Fore River yard; also belt armor being assembled for a cruiser. Among propulsion machinery, they saw huge propeller shafts and turbine rotors being machined.

Appropriately, the exercises were held in the No. 2 machine shop, largest single shop in America's oldest and largest armament plant. In the words of R. A. Lewis, general manager of the plant, "This shop has written history so far as requirements for the Navy are concerned. In this shop back in the early 90's the first guns and armament were made for the beginning of a modern Navy."

J. M. Sylvester, assistant general manager of the plant, was master of ceremonies. There were addresses by Senator James J. Davis, Congressman Francis E. Walter, Mayor Robert Pfeifle of Bethlehem and Admiral Watson. Senator Davis appealed to the workers "never to stop work, even for a second."

Commander A. J. Wellings, an inspector of naval materials, presented the Navy E button, which all employees are entitled to wear, to a group of employees with the longest continuous service records.

Cleveland Plant to Buy $1,393,647 of Machinery

Cleveland

• • • **Cleveland Graphite Bronze** Co. announced that on Nov. 26 it was authorized by Defense Plant Corp. to purchase $1,393,647 worth of machinery for production of aeronautical equipment. This machinery will be installed in the concern's $3,000,000 plant nearing completion here.

Wants Priority-Hit Plants, Like Farms, to Get U. S. Aid

Chicago

• • • **It is claimed that** 70,000 here face unemployment due to priorities, and Mayor Edward J. Kelly has been furthering a program designed to bring help to the city's small manufacturers. Kelly has sent to Floyd B. Odlum, head of Defense Contract Distribution Service, a five point program, which it is understood has been unofficially approved. The program provides for (1) contracts to small firms on a cost-plus basis; (2) compensation to the small businessman put out of business by priorities on the same basis compensation is given a farmer whose crops are damaged by the army when on maneuvers; (3) use of vacant factory space before erection of new plant buildings; (4) stimulation of development of substitute materials; (5) organization of a clearing board representing all agencies concerned with defense production to expedite the solution of small business problems.

It is also understood that OPM is considering granting "distress certificates" to critical manufacturers which will give them preferment in contract bidding.

Road Headed by Schwartz Gets Illinois Charter

Springfield, Ill.

• • • **The Springfield** & Southwestern Railroad Co. has been chartered under the laws of Illinois to operate that part of the railroad from Springfield to Curran, Ill., which was formerly part of the Chicago, Springfield & St. Louis Railway Co.

Benjamin Schwartz of New York, formerly Director General of the Institute of Scrap Iron & Steel, Inc., is president of the railroad company.

Denver Arms Plant Expands

Washington

• • • **The War Department** has announced authorization for the expansion of the Denver ordnance plant at Denver at a cost of several million dollars.

Experience Counts Today!

HOT COIL CONVEYER AT SHARON STEEL CORPORATION SHARON, PENNA.

MATHEWS ENGINEERS have it!

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INCREASED CAPACITY FOR NATIONAL DEFENSE

Our plant capacity has been increased over 65% to care for the rising demands of the National Defense Program — plus the normal demands of peacetime production.

All orders, whether subject to defense priorities or not, are given the same helpful care and attention that have always marked our dealings with prospects and customers in the past.

MATHEWS CONVEYER COMPANY, ELLWOOD CITY, PENNA.

FIELD ENGINEERS AND SALES OFFICES LOCATED IN 30 INDUSTRIAL CENTERS

BREAKFAST IN A BOMB SHELTER: When American Rolling Mill Co. opened a bomb shelter for inspection at Ashland, Ky., recently, one feature included a breakfast for prominent citizens of the Tri-State Area. The shelter is the same as those being supplied the Army and Navy and also those used in England. It was camouflaged with dirt, sandbags, vines and trees and a green chemical compound. Interior fittings duplicated those in English shelters, including gasoline stove; dishes and utensils; chemical toilet; water barrel; fire extinguisher; pick and shovel; food lockers; stretchers, etc. A ventilating system insured continuous supply of fresh air. About 15,000 persons inspected the bomb shelter.

Secret Gun Produced At Harvester Plant

St. Paul, Minn.

• • • **Official army approval** of the intermediate-caliber artillery gun has been given International Harvester Co., who is making the gun here. The weapon, an army secret, will soon be in full production and it is estimated will reach a total of 60 a day by May. Factory officials estimate it will require another month before production starts steadily.

Canada Seeking 2 Million Tons of Steel from U. S.

Ottawa

• • • **An effort to** obtain 2,000,000 tons of steel from the United States was being pushed last week by Canada. C. D. Howe, minister of munitions and supply for the dominion, was in Washington negotiating for the steel, which is needed to supplement Canadian production. He stated that there is reasonable prospect the additional supply will be forthcoming from the United States.

F. B. Kilbourn, Canadian steel controller, stated last week that despite the fact steel production in Canada has been doubled in the past year, a very serious shortage is threatened in the coming year. It may be over a million tons, he said.

Canada's Imports Total $137 Million in September

Ottawa

• • • **Canada's imports,** excluding gold, for the month of September, totaled $136,991,000 compared with $86,287,000 in September, 1940. Principal imports in September, with corresponding totals for 1940 in brackets follow: Iron and its products, $37,379,000, ($26,023,000); non-ferrous metals, $7,508,000, ($6,064,000); non-metallic minerals, $21,324,000, ($15,121,000); chemicals, $5,877,000, ($4,054,000); agricultural products, $18,370,000, ($10,680,000); fibres and textiles, $12,554,000, ($7,815,000); wood and paper, $2,905,000, ($3,028,000); miscellaneous commodities, $27,454,000, ($11,591,000).

Fedders Gets New Order For Machine Gun Links

Buffalo

• • • **The Fedders Mfg. Co.** has announced receipt of an additional War Department order of $2,319,974 for machine gun bullet links. It was a companion order to previous contracts and means the present capacity production peak will be maintained for at least several months. Fedders is reported working on plans for a $1,000,000 factory addition in suburban Tonawanda Township.

Houghton's QUENCHING OIL developed solely for HIGH SPEED QUENCHING OF SHELLS

History repeats itself. In the first World War Houghton helped establish a procedure for heat treating shell steel. Again the problem arises, as shortage of types of steel for projectile use, combined with higher yield strength requirements, make it necessary to quench high explosive shells.

The quench is the crucial part of the heat treat. It must be uniform. It must be rapid in cooling through the critical range. The oil must not sludge or clog up cooling systems. It must not oxidize nor fractionally distill.

These are the requirements—a speedy, uniform quench, yet not so fast as to cause any tendency to crack or distort.

HOUGHTO-QUENCH G has been developed to fill this need. Its merits are set forth on this page. It is made solely for quenching; by dilatometer test it has definitely faster quenching speed. It is an exclusively treated oil, superior on all counts to other quenching oils against which it has been tested for speed, depth of hardness and stability. Yet it is priced right to provide an economical installation.

WHY HOUGHTO-QUENCH "G" EXCELS:

1. Possesses faster quenching speed.
2. Provides uniform hardness; greater depth of hardness.
3. Stable; non-sludging.
4. Wets out steel surfaces rapidly.
5. Though fast in heat absorption, it will not distort or crack work.
6. Meets needs for flash, fire and viscosity.
7. Priced right for volume requirements.

For full data on HOUGHTO-QUENCH G and description of pressure quenching and cooling systems, write Dept. A.

E. F. HOUGHTON & CO.

Chicago - PHILADELPHIA - Detroit

HOUGHTO-QUENCH "G"

Full Allocation Set on Steel Plates

Washington

• • • **As the first step in** connection with SPAB's request of Nov. 1 that a direct allocation system for steel be worked out, the Office of Production Management on Monday ordered complete allocation of steel plates. Heretofore steel plate production has been only partly under allocation but now all output is subjected to allocation in General Allocation Order No. 1.

As of Nov. 1, reports from steel plate producers showed defense and essential civilian orders, with ratings of A-10 or higher, of 850,000 tons for shipment during the month, it was stated.

The allocation order defines plates and provides that after Dec. 1 no person shall produce, deliver or accept plates except in accordance with the orders of the Director of Priorities. Producers are required to file with the OPM Iron and Steel Branch, by the 15th of each month, a schedule of production and shipments for the following month, together with a statement of unfilled orders for the period. They then will receive an allocation order from the Director of Priorities, making any changes that are deemed advisable.

Plates produced in excess of schedule cannot be disposed of except at the direction of the Director of Priorities. The order also provides that suitable forms for producers and customers will be prescribed from time to time.

Studies of steel plate requirements for non-defense industries now are being made by the Division of Civilian Supply in conjunction with the Division of Materials to determine what proportion of the available supply should be allocated to each. No direct allocations of this kind have yet been made, although substantial steps in this direction are being taken.

OPM Metal Orders Extended

Washington

• • • **OPM last week** extended the life of all of important orders affecting the metal working industry which would otherwise have expired on Nov. 31. The extensions announced varied from a month only to May 30, 1942.

The orders which have been extended are as follows: Order E-2-a, covering machine tools, now has an expiration date of Feb. 28, 1942. Order P-18-a, involving materials for cutting tools, has also been extended to Feb. 28. Order P-39 which assigns ratings to material for arc and resistance welding machines was extended to March 15. The calcium-silicon order M-20-a was extended to May 31 and, in addition, several minor changes were made in the terms of the order. Order P-23, relating to mining machinery and equipment, has been made effective to Dec. 31. Foundry equipment order P-31 is extended to May 30.

Orders affecting pig iron and

steel, M-17, M-21-a and M-21-b, have all been extended one month to Dec. 31. The extension of M-21-b automatically extends the controls on warehouse shipments another month.

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Washington

• • • **Sharply limiting** the use of chromium and chrome steel, OPM's Priorities Division last week issued two orders which have the effect of retaining for defense manufacture all of the high chromium content alloy steel produced after Dec. 1 and to earmark for defense the nation's stock of chromium.

The first order, M-18-a, places in the hands of the Director of Priorities direction of all deliveries of chromium. The second, M-21-a, prohibits the manufacture and delivery of alloy iron and steel containing 4 per cent or more chromium except on A-10 or higher preference ratings.

Main provisions of the amendment to M-21-a are: 1. Except under a specific rating of A-10 or higher, or specific permission of the director of priorities, no producer shall process beyond ingot, bloom, billet, sheet, bar or slab, or after Dec. 1 1941, deliver any alloy iron or alloy steel containing 4 per cent or more chromium.

2. The director of priorities may issue directions allowing or forbidding specific deliveries of chrome alloy steel.

Main provisions of M-18-a are: 1. Full control of deliveries of chromium is lodged in the director of priorities and monthly requests for chromium must be made to producers.

2. The aggregate chromium oxide content of chemicals is limited in each month to one-twelfth the amount of ore used in chemicals actually delivered in the twelve months ended June 30 1941.

3. The order revokes Order M-18, issued July 7, 1941, and becomes effective Nov. 29, 1941.

OPM said that approximately 55 per cent of our total chromium supply in 1941 was used for alloying steel, with refractory use second in volume. More than 70 per cent of metallic chromium currently, it was added, is being used for defense and essential civilian purposes.

While domestic production of chromium has increased greatly since the start of the defense program, OPM pointed out, more than 90 per cent of all our chromium must be imported, largely from Africa, the Philippines and Turkey.

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No. PD-73 Needed on Exports

• • • **An additional copy** of Form PD-73, previously required on export sales, no longer need be filed in such instances with OPM. The Office of Export Control, which

had been receiving the additional copy, no longer requires it, it was announced.

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Vacuum Cleaners Limited

Washington

• • • **Curtailment** in production by large manufacturers of vacuum cleaners, ordered last Thursday by OPM's Division of Priorities for the Oct. 1-Dec. 31 period, will reduce their output during the three months to 10 per cent below average monthly factory sales for the year ended June 30 or to 15,600 units, whichever would result in greater output. Large manufacturers are those whose average monthly sales are from 5200 units up.

Manufacturers whose average monthly sales are less than 5200 are restricted to an output of 100 per cent of average sales in the year ended June 30. OPM said that the industry has practically eliminated aluminum in present models and estimated that this will result in savings of more than 3000 tons of aluminum a year. Total steel consumption by the industry in 1940, OPM said, was less than 10,000 tons.

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Foil Order Suspended

• • • **OPM has announced** that the lead and tin foil order L-25 issued Nov. 24 has been suspended for 30 days. During the period of its suspension an investigation will be made to get all of the facts upon which the order was based, that a final decision may be reached as to whether the order should be revoked, modified or put into effect unchanged.

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Discuss Auto Price Fixing

Washington

• • • **In a meeting** held Dec. 1 to discuss the percentage of profit to be allowed automobile dealers, coordinate with the fixing of manufacturers' prices, OPA's Automobile Section Chief, Cyrus McCormick, suggested two alternative formulas. The 175 dealers present were told that wholesale as well as retail prices would have to be subject to control because OPA already sees evidence of automobile price inflation.

Revisions for The Iron Age Priorities Guide

• • • **Following revisions should be made to the Allocations and Priority Guide which appeared as a supplement to the Nov. 27 issue of THE IRON AGE.**

Under "P-Orders," pages 3 and 4 add:

P-45-a—Material for equipment and tools for fire fighting equipment for U. S. Forest Service (11-22). Related form is PD-81.

P-74—Material for heat treating furnaces (11-22). Related form is PD-81.

P-82—Material for work performed by blind persons 11-29. Related forms are PD-81 and PD-166.

Under "M-Orders," page 5 add:

M-18-a—Chromium and chrome steel (11-29). Revokes M-18. Related forms are PD-53-a and PD-53-b.

M-25—Amendment No. 3 (11-17). Use in bases for radio tubes. Amendment No. 4 (11-17). Use of synthetic resins for molded radio cabinets.

M-44—Titanium dioxide (11-21). Related forms are PD-145 and PD-146.

Under "L-Orders," page 4, add:

L-4—Amendment (11-22). Alters base periods for establishing quotas.

L-18—Restricts output of vacuum cleaners for household use (11-27). Related forms are PD-170 and PD-171.

L-25—Restricts use of lead, tin or composition foil (11-24). Effective date suspended 30 days from original date in announcement PM-1668 issued Nov. 28.

Under "OPA Price Ceilings," page 5, add:

No. 42—Paraffin wax (11-21).

No. 43—Second hand steel drums (11-24).

No. 44—Douglas fir doors (11-27).

Under "Forms to Use," page 7, add:

PD-134 — Monthly report on metal office furniture and equipment inventories and production, and metal inventories, receipts and consumption, re: L-13.

PD-136—Application for conversion of weights of metals other than steel to an equivalent weight of steel, re: L-13.

PD-145—Application for allocation of titanium pigments, re: M-44.

PD-146—Monthly requirements of titanium pigments, re: M-44.

PD-166—Application for priority rating, re: P-82.

THIS WEEK'S

Prices and Priorities

Rolled zinc sheets, strip and plates placed under a price ceiling on Nov. 29. (OPA:PM1664)

Second-hand steel drum prices fixed by schedule No. 43 issued Nov. 24. (OPA:PM1636)

Scrap steel prices at Los Angeles and San Francisco adjusted upward to increase flow in that area in amendment to schedule No. 4. Oregon defined as a "remote scrap area." (OPA:PM1637)

Production Requirements Plan, an improved version of the Defense Supplies Rating Plan, together with use of OPM form PD-25-a, described. (OPM:PM1635)

Chromium steel distribution placed under priority control in order M-18-a issued Nov. 27. Manufacture or delivery of steel containing more than 4 per cent Cr prohibited subject to new controls in amendment to order M-21-a. (OPM:PM1652)

Titanium preference order M-44 to become effective Jan. 1, 1942, instead of Dec. 1 as originally scheduled. (OPM:PM1647)

Household furniture price schedule held in abeyance due to leveling off of prices. OPA warns, however, prices will be watched closely and if necessary a schedule will be issued. (OPA:PM1656)

Electric power curtailment of 30 per cent for industrial and commercial users in Southeast indefinitely postponed. (OPM:PM1653)

Defense housing critical area list extended by addition of five towns in Alaska, two in Puerto Rico, and one each in Hawaii and the Virgin Islands. (OPM:PM1651)

Domestic wood pulp prices will be unchanged through first quarter of 1942, due to voluntary agreements between producers and OPA. (OPA:PM1650)

Writing, book and printing paper (excluding newsprint) prices will not be increased in the near future, industry has advised OPA. (OPA:PM1649)

Vacuum cleaners made for household use subjected to 10 per cent reduction makers order to cut output of cleaners for household use 10 per cent in limitation order L-18 issued Nov. 27. (OPM-PM1643)

Institutions for the blind given priority assistance in acquiring scarce material in order P-82 issued No. 29. (OPM:PM1657)

Lead emergency pool requirements for December put at 15 per cent of October production. (OPM:PM1672)

Zinc emergency pool for December announced as 29 per cent of August output. (OPM:PM1670)

Mining machinery and equipment prices discussed at Washington to determine if ceiling schedule is necessary. (OPM (OPA:P (OPA:T59)

Calcium-silicon preference order M-20-a revised and extended to May 31, 1942. (OPM:T57)

Douglas fire door prices reduced about 15 per cent from current levels in price schedule No. 44 to become effective Dec. 10. (OPA: PM1661)

Door, door frames, sash, window frames and screens made of Western Pine to be placed under a formal ceiling. Prices currently stabilized by voluntary agreements. (OPM: (OPA:PM1660)

Lead and tin foil limitation order L-25 suspended for 30 days for further study. Order originally would have become effective Nov. 24. (OPM:PM1668)

Preference orders extended last week were: M-17, M-21-a and M-21-b to Dec. 31, P-31 to May 30, 1942 (OPM:PM1626); E-2-a and P-18-a to Feb. 28, 1942, and P-39 to March 15 (OPM:T58); P-23 to Dec. 31 (OPM:PM (OPM:T63)

Plate steel made subject of first formal allocation program in General Allocation Order No. 1 issued Nov. 29. Distribution of plates put entirely under OPM control. (OPM:PM1680)

• • •

For copies of above announcements address defense agency concerned, at Washington, giving announcement number as shown in parentheses after each paragraph. *(For example,* OPM:PM1500 *means announcement* 1500 *issued by Office of Production Management).*

THE *Phantom Gear* JOINS THE NAVY!

TURNING TIME on some vital parts for Navy use has been cut from 21 hours to 3½ hours . . . six times as fast . . . with Monarch automatic sizing controls. Automatic sizing, applied to Monarch lathes, provides automatic production on such work as any combination of steps, taper and contour turning, boring or facing.

Back of such Monarch contributions to lathe utility is that attitude which we call "*The Phantom Gear.*" Made up of initiative, open-mindedness and courage to try new ideas, "*The Phantom Gear*" inspires management and men to increase the usefulness and efficiency of Monarch lathes.

* * *

This vitalizing force, now enlisted in National Defense, has doubled our production in 1941 over 1940, without any sacrifice of quality. When peacetime returns, with its demand for more goods for more people, at lower cost, Monarch will be ready with still more useful lathes.

THE MONARCH MACHINE TOOL COMPANY . . . SIDNEY . OHIO

Monarch's March of Progress

Monarch initiative has made the lathe a more useful tool by the introduction of such improvements as:

Automatic sizing for all size lathes
Helical geared headstock
Anti-friction bearing mountings for all rotating parts
Flanged spindle nose
Automatic force feed lubrication
Anti-friction bearing taper attachment
Flame-Hardened beds

Even as the emergency presses us to more and more production, new refinements in design and shop practice are continuously at work to maintain Monarch leadership.

MONARCH LATHES

COVER THE TURNING FIELD

Railroads Put Limit on Car Designs and Materials

• • • **Construction** of new rolling stock will be limited to certain designs now in use, thus helping conserve metals for defense, according to announcement Dec. 1 by J. J. Pelley, president of the Association of American Railroads.

Construction of new box, hopper, gondola and flat cars will be limited to certain designs now in use; new locomotive construction will be limited to existing designs where patterns, dies and engineering data are already available; substitution will be made wherever possible for scarce metals in locomotive and freight car construction; use of carbon steel rather than alloy steel will be attempted in locomotive boiler construction; steel plates and steel sheets 48-in. wide will be used in the construction of new freight cars instead of sizes now largely used ranging up to 119 in. in width.

Car and locomotive builders will interchange plans, engineering data and patterns which will expedite the building of railroad equipment and increase the capacity of facilities used for that purpose.

The standard box car will be 40½ ft. long inside and the automobile box car will have an inside length of 50½ ft. There also will be two types of hopper cars, one having a 50-ton capacity and the other 70 tons. Standardized types of gondola and flat cars also are prescribed in the plan. None of these cars will have a greater inside width than 9 ft. 2 in. or an inside height at eaves of 10½ ft.

Use of nickel steel for locomotive bed castings, axles, and rods and other moving parts both for new construction and repairs and for steel plates and rivets for repairs on existing locomotives constructed of nickel steel will continue, under the agreement.

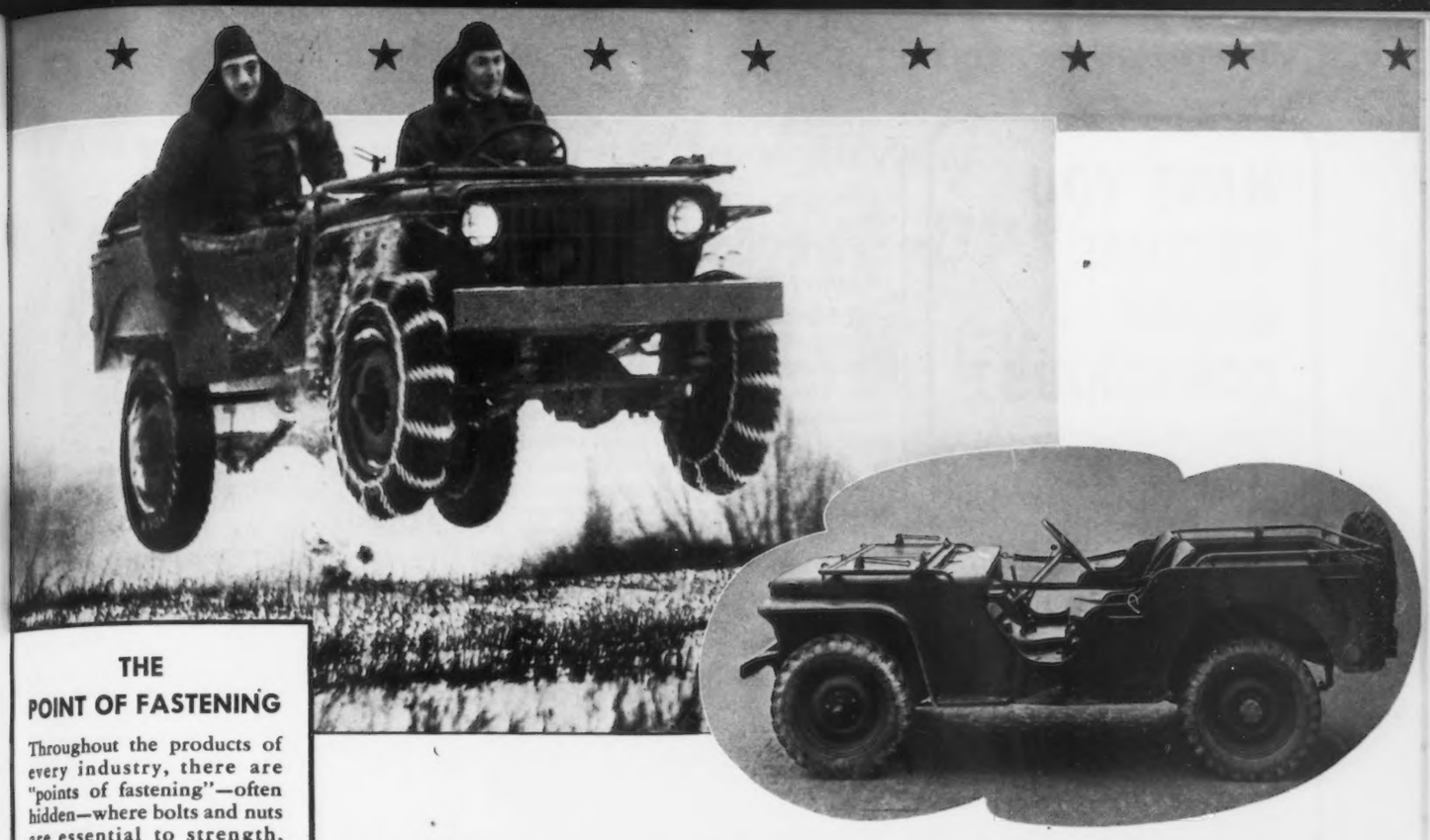
Big Russian Press Order Goes to Baldwin-Southwark

Philadelphia

• • • **The Baldwin-Southwark** division of The Baldwin Locomotive Works has received an order from the Russian government, through Amtorg Trading Corp., for 10 large extrusion presses and auxiliary equipment having a total aggregate value of approximately $2,250,000.

These presses, ranging in capacity up to 4000 tons, will make possible the rapid production of light alloy shapes, tubes and rods, to be used in the manufacture of a wide variety of defense material, including airplanes and tanks.

MOVABLE STEEL OVERPASS: This Tournapass, a streamlined structure of three 60-ft. alloy steel spans, a center arc span and two end spans, designed for emergency use in ending traffic jams, is portable. The overpass, of arc welded construction, was built in the experimental department of the LeTourneau Co. of Georgia. Welders used were Hobart 220-ampere electric drive welders.



THE POINT OF FASTENING

Throughout the products of every industry, there are "points of fastening"—often hidden—where bolts and nuts are essential to strength, necessary for security, and fundamental to proper adjustment. For bolts, nuts, and their modifications provide the *only* fastening method by which parts can be securely and rigidly held, yet readily tightened or loosened for adjustment, disassembly or reassembly at any time.

FORD Jeeps Travel as the crow flies

and Bolts and Nuts withstand the strain

Test drivers, the men who make a living laughing at danger, are demonstrating the outstanding qualities of the latest reconnaissance car built by Ford Motor Company for the U. S. Army.

Scout cars, like the one in the picture, can ride the highway or roll across country as the crow flies—they no longer waddle slowly over obstructions, but leap and bounce over rough terrain. They have speeds up to 55 m.p.h. in high gear.

The rough-and-tumble jolting and vibration of modern Jeeps impose terrific strain on bolts and nuts in many vital assemblies throughout each car—in the machines themselves and in the powerful engines that drive them. R B & W products have been purchased for many years by Ford for use in their passenger cars, trucks, tractors, and now for the Jeeps.

Throughout all industries, wherever precision and strength must predominate, EMPIRE Bolts and Nuts are known and used. Since 1845, R B & W has pioneered in producing threaded fastenings of the highest quality.

★★ AS WE STAND TODAY ★★★

The war effort has considerably changed the production picture.

Like many other manufacturers, R B & W realized several years ago that normal production schedules would prove inadequate and each month our plant facilities were gradually extended to cope with present increased demand.

Our engineers have been working long hours to develop and build better machines of higher speed and production capacity, all with a double plan in mind—to keep pace with the rapid increase of emergency demands and to deliver to our regular peacetime customers, the greatest possible supply of EMPIRE Bolts and Nuts for their own business.

966

BOLTS EMPIRE NUTS-RIVETS

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

$91 Million Expansion Of Columbia Approved

Washington

• • • **Involving an** outlay of approximately $91,000,000, DPC last Thursday announced authorization of an expansion contract with the Columbia Steel Co., San Francisco. It provides for the construction at Provo, Utah, of two more new 1000-ton blast furnaces, seven 100-ton open hearth furnaces, a blooming mill and a 120-in. plate mill. At the company's Pittsburg, Cal., plant a steel foundry with annual capacity of 30,000 tons of castings will be built. The open hearth furnaces at Provo will have annual capacity of 840,000 tons of ingots, and the plate mill at that point will have minimum annual capacity of 600,000 tons.

Previously a DPC contract provided for two new blast furnaces at Provo. The four new blast furnaces to be built, together with the existing old blast furnace at Provo, with an annual capacity of 200,000 tons, will provide an annual pig iron capacity of 1,650,000 tons. The contract for the two blast furnaces, announced Oct. 31, involved about $35,000,000 which with the new DPC-Columbia contract totals approximately $126,000,000.

More Contracts Placed For New Plant in Brazil

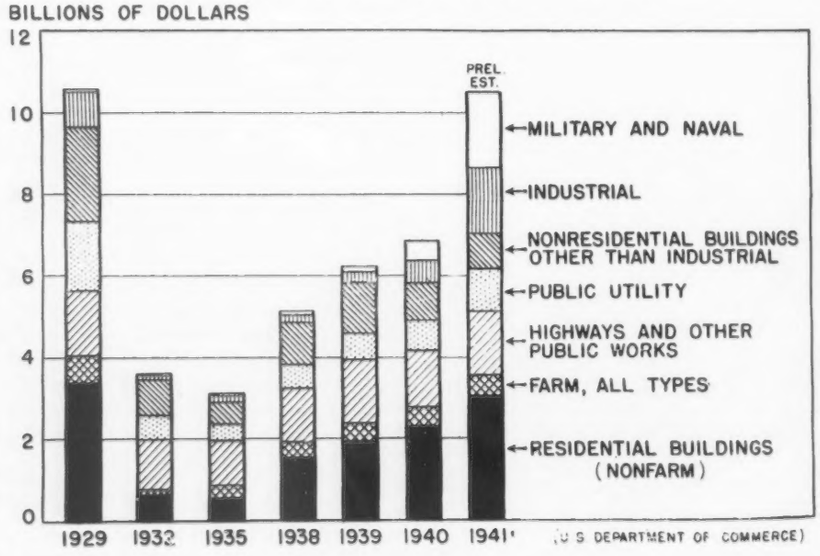
Cleveland

• • • **Placement of** the most essential orders in connection with construction of the large steel plant in Brazil was announced completed by Col. Machedo Suares, chief of the purchasing commission for Brazilian National Steel Co. At the same time, Col. Suares announced that a $2,500,000 contract for openhearth furnaces had been placed with the H. A. Brassert Co., Pittsburgh; a $550,000 contract for mill type motors had been placed with Crocker-Wheeler; a $400,000 order for the rail and structural main mill drive went to International General Electric; and a $550,000 order for a blooming mill main drive placed with Westinghouse International.

Dessau Firm 100 Years Old, In New Quarters

• • • **Maurice S. Dessau Co.**, celebrating its 100th anniversary this year, has moved to new quarters at 535 Fifth Avenue, New York. The company makes diamond pointed drills for industrial purposes.

BUILDING AND DEFENSE: The above chart shows a comparison of the estimated value of construction activity in the continental United States in recent years, as reported by the U. S. Department of Commerce.



NAILS TO RUSSIA: This keg of nails from Youngstown Sheet & Tube Co., destined for Russia was shipped by way of the Persian Gulf.

Contract Train Attracts 7000 Persons in East

• • • **Around 7000 individuals** representing 4000 eastern companies visited the special defense contract train from the time it started touring the East until late last week, according to OPM. At Portland, Me., 300 visited the train; at Worcester, Mass., 350 attended; at Springfield, Mass., 989 turned out and at Rutland, Vt., the crowd was estimated at 500.

Out of the thousands of items on the train, many provided inspiration for manufacturers desirous of switching to defense production. A welder at Portland found he might make "collective protectors" for dispelling gases from dugouts. A shoe machinery maker discovered a spindle used in the construction of torpedoes which he felt he could make. A maker of silverware found flat work and stampings which could be made in his plant.

Buffalo Subcontractors Told Orders Rest on Salesmanship

Buffalo

• • • **Small industrial plant** owners, visiting a special train containing samples of more than 21,000 items the government wants to buy, were told here this week not to sit down and wait until the government or some prime contractor hands them an order. They were told that results rest entirely upon their sales ability.

P. & W. Employees to Get 5% Christmas Bonus

West Hartford, Conn.

• • • **All employees on the payroll** of the Pratt & Whitney Division of Niles-Bement-Pond Co. as of Dec. 1 will receive a 5 per cent Christmas bonus, based on total earnings, including overtime, received from June 30 to Dec. 27, according to Clayton R. Burt, president. December earnings will be computed on the basis of average earnings for the previous 12 weeks. This bonus, which amounts to approximately $650,000, is the third one this year, the first of 8 per cent, having been distributed on July 1 and the second of 5 per cent during September. There are now about 4500 hourly workers on the payroll.

Last January, a general 5 per cent wage increase was granted all workers. Upon payment of the compensation for the first half year, the company announced another wage increase amounting to 10c. an hr. for all employees. Altogether, Pratt & Whitney employees will have received over $2,500,000 in the form of wage increases and extra compensation in 1941.

Coming Events

Dec. 1 to 6—18th Exposition of Chemical Industries, Grand Central Palace, New York.

Dec. 6 to 13—National Motor Truck Show, Philadelphia.

Jan. 12 to 16—Society of Automotive Engineers, annual meeting and engineering display, Detroit.

Jan. 20 to 22—Western Retail Implement & Hardware Association, Kansas City.

Jan. 26 to 29—American Society of Heating & Ventilating Engineers, annual exposition, Philadelphia.

Feb. 23 to 28—Automotive Service Industries Show, Atlantic City, N. J.

April 14 to 17—Packaging Exposition and Conference, Hotel Astor, New York.

April 15 to 18—Electrochemical Society, spring convention, Nashville, Tenn.

May 25 to 28—National Association of Purchasing Agents, Waldorf-Astoria Hotel, New York.

OPM Buzzes the Wires; Salvages 3500 Tons Scrap

Washington

• • • **Joint efforts** of several branches of OPM cooperating with the State of Washington Toll Authority have resulted in the salvaging of approximately 3500 tons of scrap steel originally scheduled to be dumped into Davy Jones' Locker. OPM is happy over the rescue, made after a busy buzzing of telegraph wires.

By saving the precious material of the ill-fated Tacoma Narrows bridge from death by corrosion in Pudget Sound, OPM estimates that with an equivalent tonnage of pig iron, it can be used in the production of 100 light or medium tanks, 200 four-ton trucks or 600 16-in. Navy shells.

Synthetic Pine Oil Made By New Process

• • • **A new process** for the synthetic production of pine oil from gum turpentine which makes it possible for the naval stores industry to meet current demands of the national defense program for this material has been announced by Hercules Powder Co.

Pine oil is now required in great quantities for the separation of metals from their ores. Defense demands for zinc, lead, copper, and molybdenum have greatly increased consumption.

RIVER IN A TUBE: From the upstream end of one of the river outlets in Friant Dam, Calif., a workman watches the water rising in the newly formed reservoir. The San Joaquin River soon will be flowing permanently through a series of these pipes, which are 9 ft. 2 in. in diameter.

NEWS OF INDUSTRY

Cut in Raw Materials Faces French Industry

• • • **The French** iron industry is to get only one-half its pre-war requirements in raw materials to meet the winter months, according to an official announcement published in all newspapers of unoccupied France early in October. The pre-war consumption by the French metallurgical industries reached 230,000 tons monthly. In the months following the Franco-German Armistice, consumption slumped to 145,000 tons per month.

During the winter, the iron ore available for the whole of France will be only 110,000 tons. This means the iron industry is working only half-time, with worse prospects in store.

The position is paradoxical in view of the fact that before the war France exported 12,000,000 tons of iron ore from an annual production of approximately 40,000,000 tons.

Defense Shipments Rise For American Rolling Mill

Middleton, Ohio

• • • **Steel for defense** will absorb 63.25 per cent of total November shipments from parent company plants, Charles R. Hook, president of American Rolling Mill Co., said last week.

In October, defense shipments represented 58 per cent of shipments from parent company plants, he stated.

Defense shipments of Sheffield Steel Corp., wholly owned subsidiary of Armco, absorbed 85 per cent of total September shipments; 81 per cent during October and will amount to 95.38 per cent of November tonnage, Mr. Hook said.

Planes Solely for Cargo Seen as Likely Soon

Cleveland

• • • **Operation** of planes for cargo only were predicted to be a near-term reality by R. L. Anderson, chairman of the Engineering and Maintenance Committee of the American Transport Association, in his report to the committee at a conference here. Mr. Anderson stated that the S-40 Sikorsky flying boats are now being converted into cargo craft by Pan American Airways.

Wages Rise at New York; Appeal to OPA Urged

• • • **An advance** of 5c. an hour in the basic wage for the scrap iron industry in New York City was announced Nov. 27 by a board of arbitration before which had been submitted a revision of a labor contract between the New York chapter of the Institute of Scrap Iron and Steel, Inc., and a local union of the A. F. of L. Effective for one year from Oct. 1 the minimum for yardmen will be 62½ cents, against 57½ cents previously and against $1 per hour which the union requested.

The three arbitrators recommended that both employers and the union jointly should seek from OPA a revision of either the scrap iron ceiling prices for New York, or modification of the section of the price schedule fixing the cost of scrap preparation in view of the fact that in the opinion of the arbitrators such margin is insufficient at the present time and particularly in the light of the new wage adjustments.

WELDED GUN CARRIAGES: Production of carriages for 155-mm. field guns is so organized at the Pettingbone Millikin Corp., Chicago, that 350 men are producing 40 complete units per month. Welding positions enable down-hand welding on practically all joints of the precut high tensile steel parts.

15 Mills to Ship Steel for Britain

Pittsburgh

• • • **Indications are** that the series of actions taken or planned by OPM in past month point definitely to an all-out steel production for the Army, Navy, Maritime Commission, and lease-lend requirements. It is expected that all attention will be directed upon expediting shipments of steel to these major groups regardless of how it affects scheduled shipments to other steel consumers carrying priority ratings.

Already OPM is working toward more or less complete allocation in the steel industry with emphasis on plates, certain types of hot rolled bars, tool steel, and alloy steels. Plates have been under a complete allocation setup for several weeks and all lend-lease requirements have been on such a basis for some time. Although Washington officials have stated many steel products will not be subject to allocation, it is hard to see how this can be prevented.

Government agencies have allocated approximately 762,000 tons of lend-lease steel, mostly ingots and semifinished, for shipment during the first three months of 1942. This is approximately half of the contemplated British requirements for the first six months of 1942 mentioned a few weeks ago. The allocations include approximately 210,000 tons of ingots, 270,000 tons of slabs and billets, and the balance of 282,000 tons includes rails, shell steel, and other semi-finished products. These needs of Great Britain were allotted to about 15 steel companies.

Speaking here last week, Stanley Adams, Chief Consultant, OPM Iron and Steel branch, disclosed that December demand for products made on the plate mills and which carry an A-10 rating or better, will run between 850,000 to 900,000 tons with total output expected to be somewhere between 600,000 and 625,000 net tons. This situation is responsible for the series of re-allocation reported last week.

The plate situation, even though under an allocation setup, is expected to be tighter than ever and there is a definite possibility that over the next few months, at least, attention will be focused 100 per cent on production of plates for the Maritime Commission and the Navy. Other plate customers with priorities will have to take a "back seat" for the time being.

It is believed the move to step up substantially plate production and clear up delinquent deliveries is partly due to the definite probability that the Maritime Commission soon will be in the market for close to 750,000 tons of plates.

Terry Advanced in Ohio OPM

Cleveland

• • • **C. Roscoe Terry** has been appointed state director for Ohio for the field organization of OPM, Division of Contract Distribution.

Restraining Influences on Factory Output Listed

• • • **Three restraining** influences upon factory output are summarized in a new booklet-editorial, No. 42 in a series, published by Farrel-Birmingham Co., Inc., Ansonia, Conn. They are: loss of man-hours due to strikes, this loss rising 122 per cent in a single year; the limitation imposed upon man-hour expansion by the 40-hour work week and consequent scrambling for skilled and semi-skilled help; artificial stimulation of demands for higher wage rates, resultng in higher costs for defense and for labor's own sustenance.

The booklet estimates that in United States factories within the past year man hours have increased only (at best) one-half that required and "probably only one-third of actual requirements."

Temporary suspension of the maximum-hour law is necessary, the editorial concludes.

More Awards Needed, Is View at West Coast Clinic

San Francisco

• • • **Although nearly** 2700 little business men attended the National Defense Production Clinic sponsored by the OPM Division of Contract Distribution here Nov. 24 and 25, many of them expressed the opinion that more and bigger prime contracts would have to be awarded in this area before there could be much extension of sub-contracting.

The 28 prime contractors and the various government purchasing departments with displays conducted more than 1700 written interviews with prospective sub-contractors, but most of the actual business traceable to the clinic will be between the government supply offices and little business.

Most prime contractors said that they were able to handle with their own facilities contracts which they now hold. Contacts made at the clinic were regarded more as a stockpile of reserve production facilities in case present contracts were greatly expanded.

Despite extensive surveys over the last 20 years, military purchasing agencies reported uncovering a number of facilities previously unknown to them. Many small shop owners left the clinic declaring they had not previously comprehended what a wide range of products were being bought by the military branches.

One small manufacturer said the Division of Contract Distribution yet has much work to do in spreading sub-contracting. According to this view, prime contractors are not disgorging all the work they could. A still more discouraging slant was provided by another small manufacturer who declared that a prime contractor for ordnance in northern California had built brand new facilities duplicating those he had to offer rather than let him undertake this type of work.

A machine shop operator from the hinterland said prime contractors had only put on display their most difficult work with the closest tolerances in order to frighten away prospective sub-contractors.

Full Allocations in Steel Unjustified, Says OPM Official

Cleveland

• • • "**No complete allocation** basis is in the making for steel," Charles Halcomb, chief priority specialist of the Iron and Steel Section of OPM, declared during a "priorities clinic" at Hotel Statler here. The clinic was attended by 1687 representatives of concerns affected by Federal control measures.

Mr. Halcomb added, "It just doesn't make sense. A special engineering survey of what allocations would entail for the government revealed that this would cost $25,000,000 and necessitate an expansion of the OPM's Iron and Steel Branch staff from 200 up to about 4000 persons. With the steel industry doing a very fine job of handling priorities under the present set-up, there is no justification for Federal adoption of complete allocations for steel."

Mr. Halcomb estimated that from 35 to 40 per cent of 1942's non-defense needs will be met. He referred to plates as "the tightest item," stating that the maximum monthly production at present is 600,000 tons, whereas December, 1941, requirements are placed at 950,000 tons. He pointed out that strip mills are being converted over into rolling plates, and estimated that complete conversion would make available an output of about 12,000,000 tons. He observed that the Army and Navy desired four months' requirements of steel to be kept on hand, but OPM is now only allocating to them actual needs.

Mr. Halcomb's discussion was one of a series of explanatory talks given by government representatives on priorities and allocations. The "pattern of the priorities system" was explained to the audience by John H. Martin, assistant policy director of the OPM priorities division, who stated that, "there will be no major turnover from priorities to something radically different, but rather a gradual development of the present system. He defined a priority as "a time preference claim on a certain amount of material for a particular use." He praised the machine tool industry for "having doubled within two years its ability to chew metals," and predicted that the first 90 days of 1942 will see 90 merchant ships completed.

During a morning press interview, Mr. Martin said OPM would soon announce a new division to insure sufficient supplies of scarce materials to small industries facing shutdowns. In many cases, he stated, only a small amount of metal was needed by some firms to stay in business. He cited a musical instrument manufacturer who needed only 40 pounds of aluminum every six months to keep from shutting down, and that about 12 pounds of brass will keep one costume jeweler busy for about a month. Moreover, firms of this type are seldom adaptable for defense work.

DPC Signs Lease Contract For Steel Plant in Texas

Washington

• • • **The DPC** last Thursday announced that a $22,670,855 five-year lease contract had been made with Sheffield Steel Corp. of Texas, subsidiary of American Rolling Mill Co., for expansion of its plant now under construction 10 miles east of Houston, Tex., on the Houston ship channel. The units to be added are a 700-ton blast furnace, two 100-ton open hearth furnaces, a blooming mill and a plate mill. The size of the plate mill has not been definitely determined but it probably will be of the 120-in. type. The blast furnace will have an annual capacity of 245,000 tons of pig iron. The openhearth furnaces will have a capacity of 304,819 tons of ingots and the capacity of the plate mill will be 216,000 tons.

Chicago Plant Expansion $86 Million in November

Chicago

• • • **Total scheduled plant** expansions in Chicago for November was only slightly less than the total for the first 11 months of 1940, with the figures for November 1941 being in excess of $86,000,000, and only $91,544,600 for almost all of 1940. Included in this year's figures for November are a $15,000,000 expansion by Carnegie-Illinois Steel Corp. at its Gary steel works. A new open hearth, reconstruction and expansion of an existing blast furnace, increase of soaking pit capacity, rebuilding of a battery of coke ovens and additional ore unloading facilities form the Carnegie program. Republic Steel Corp. will operate a new 504,000 ton alloy steel plant in South Chicago.

Forged Axe Standards

Washington

• • • **Available varieties** of forged axes are limited to about 200 on Dec. 1 by a revision of a simplified practice recommendation as compared with 845 in 1935, when the original recommendation was adopted. Until the printed issue is available, mimeographed copies of Simplified Practice Recommendation R158-41 may be obtained without charge from the National Bureau of Standards, Washington.

$1 Billion in Defense Orders Booked in Pennsylvania

Harrisburg, Pa.

• • • **Primary defense orders** held by manufacturers in Pennsylvania during the first 12 months of the national defense program totaled about $1,320,492,089, of which nearly $795,102,700 were for ships, according to a recent report of the Pennsylvania State Department of Commerce.

These estimates do not include orders valued at $75,418,977 placed with Pennsylvania contractors for work in other states or $14,432,251 in orders placed with out-of-state contractors doing work in Pennsylvania.

On The Assembly Line

(CONCLUDED FROM PAGE 76)

red-tape cutting in the nth degree, and helps to explain why even government red-tape has not succeeded in slowing down the program.

Fisher Body's success in getting deliveries underway (reported here Nov. 13) has probably been aided considerably by the close affiliation between North American Aviation Division of General Motors and Fisher Body Division.

Addes voices his suspicion that "something is radically wrong with the method presently pursued," and that provides more than an inkling of information about the UAW axe-grinding that is just beginning.

As a matter of public record, the UAW hasn't liked bomber program methods from the first. When the Automotive Committee for Air Defense laid plans and Ford started out on his own initiative, the UAW countered with what was called "the Reuther Plan"—a proposal to convert all of the automotive facilities into airplane production. Technically the plan was unsound, but it didn't bother its proponents even when obvious flaws were pointed out. The plan hasn't been mentioned much until recently, but it has been far from dead in the minds of UAW leaders.

A short time ago they started talking it up again, but with a change. Instead of just wanting UAW representatives to participate in the direction of the Reuther Plan, as such, they have linked it now with the Murray Plan for industrial councils and super-planning boards. The goal is joint labor-government management control of the defense program and, later, of all industry in America.

That, in the opinion of observers in the automobile industry, is the axe they are grinding now.

You don't grind an axe without a purpose, and they have that, too. There is going to be a lot of unemployment in the automobile industry, possibly totaling 250,000 men next March when it will be most serious. That audience of workers, mostly displaced by government edicts curtailing automobile production, will be rapt listeners. *And they will have been propagandized for five or six months* with the idea that their lack of employment is the fault of the automobile industry (1) because of its unwillingness to engage in defense production, and (2) because it failed to grasp at the Reuther plan and the Murray plan of "super-planning" to avoid unemployment. Politically, this propaganda is counted on to help get Administration support behind the Murray plan.

Moreover, there also are new contracts to be signed with automobile companies during the spring months, and UAW's spouting about slowness in defense work is part of the grist that goes through the propaganda mill prior to contract-signing time.

This propaganda is being astutely used in the period when the defense program is just on the verge of realization and fruitfulness. Most of the unemployed have reason to believe that their lack of jobs, or

threats of lay-off when automobile curtailment becomes more severe, are unjustified. And there will be a campaign to convince them that an industrial council consisting of labor, government and management representatives, plus the super-planning board to which all appeals would go, would have solved the problem some other way.

The CIO convention recently rang with the battle-cry of the industrial council plan, or the Murray plan. No matter what problem came up during the convention or what plans were laid for 1942, it seemed that the Murray plan provided all the answers.

Ordnance Plant Award Lifts Indiana's Total

Indianapolis, Ind.

• • • **With award** of the $53 million Wabash River Ordnance works, near Terre Haute, Indiana's defense plants now near the $2,000,000,000 mark. Biggest single defense operation in the state is the Allison Engineering division of General Motors here, where $375,000,000 worth of liquid-cooled airplane engines are on order. Next in line are the two Studebaker aircraft engine plants in South Bend and Ft. Wayne, with $157,000,000 involved. The Indiana Ordnance Works at Charlestown is estimated at nearly $150,000,000 and is operated by du Pont, as will be the new Wabash River plant. Then there is the $42,000,000 Kingsbury ordnance works at La Porte; the ammunition depot at Burns City; the Jefferson proving ground, near Madison; and the $15,000,000 naval ordnance plant at Indianapolis.

Taxation Won't Block Price Rise, Illinois Industry Told

Chicago

• • • **Heavy taxation to prevent** inflation is an erroneous notion, Dr. Walter E. Spahr, economics professor of New York University, told the Illinois Manufacturers' Cost Association. Actually, excessive taxation can impair productive capacity and thus be as destructive as a sharp price rise followed by the inevitable reaction, he said. Penalties of war cannot be avoided in any way, he declared.

Tankers Hastened by Change in Propulsion Units

• • • **In order to** hasten deliveries of new propulsion units for tankers for the Maritime Commission, speed reduction gears will be eliminated, according to R. A. McCarty, vice president of Westinghouse Electric & Mfg. Co., which is working on a $13,000,000 order for turbine electric propulsion units to drive 35 tankers.

Each tanker will be driven by a 6600 h.p. electric motor, using power produced by a turbo- generator. The turbo-generator will operate at high speed. The motor, however, will rotate at a much lower speed, around 93 revolutions per minute.

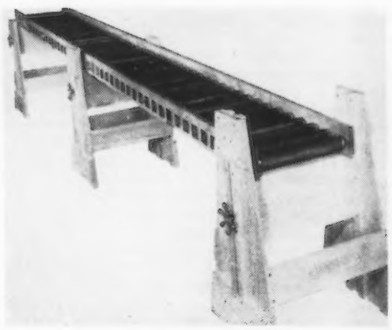
Government Awards . . .

War Dept., Ordnance:

Robert Abel, Inc., Boston; cranes and trackage $20,174
Adirondack Foundries & Steel, Inc., Watervliet, N. Y.; castings and pattern equipment 24,847
Aetna Standard Engineering Co., Youngstown, Ohio; spring rammers 2,523,056
Allis Chalmers Mfg. Co., Milwaukee; parts 54,381
American Car & Foundry Co., New York; levers, steering brake shafts, etc. 1,500
American Cutter & Engineering Co., Detroit; gages 1,516
American Locomotive Co., Railway Steel-Spring Division, New York; springs 10,338
American Rolling Mill Co., Middletown, Ohio; steel tubing 2,284
American Smelting & Refining Co., Federated Metals Division, Whiting, Ind.; lead 3,975
American Steel & Wire Co. of N. J., Boston; steel 5,871
American Tool Works Co., Cincinnati; parts for lathes 2,408
American Transformer Co., Newark; transformers 1,905
American Type Founders, Inc., Elizabeth, N. J.; parts for guns. 715,043
Armstrong Cork Co., Lancaster, Pa.; shells 782,467
Auto Ordnance Corp., Bridgeport, Conn.; magazines 532,646
Automatic Die & Products Co., Cleveland; coining dies 3,198
Barber-Colman Co., Machine & Small Tool Division, Rockford, Ill.; cutters 1,650
Barbour Stockwell Co., Cambridge, Mass.; castings 3,214
Belknap Hardware & Mfg. Co., Inc., pliers 5,954
Belmont Smelting & Refining Works, Inc., Brooklyn; copper ingots .. 2,624
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J.; coil assemblies 3,404
Bendix - Westinghouse Automotive Air Brake Co., Elyria, Ohio; parts 2,843
Berger Acoustical Co., Inc., Philadelphia; installing sound deadening equipment 1,800
Bethlehem Steel Co., Bethlehem, Pa.; projectiles 657,900
bombs 28,448
Blackhawk Foundry & Machine Co., Davenport, Iowa; castings 20,608
E. W. Bliss Co., Brooklyn; conversion of case presses 3,900
E. W. Bliss Co., Toledo Machine & Tool Division, Toledo, Ohio; presses 22,256
Bliss & Laughlin, Inc., Harvey, Ill.; steel 9,172
Borg-Warner Corp., Spring Division, Bellwood, Ill.; cartridge clips 352,500
Boyar - Schultz Corp., Chicago; bolts, washers and nuts 1,184
Breeze Corp., Inc., Newark; compression starters 168,596
Bridesburg Engineering Co., Philadelphia; wrenches and screw drivers 17,705
Brown Lipe Gear Co., General Drop Forge Division, Buffalo; recutting blocks 1,396
Brown & Sharpe Mfg. Co., Providence; lathes 35,067
tool blades 1,296
Builders Structural Steel Co., Cleveland; steel 3,056
Bullard Co., Bridgeport, Conn.; lathes 593,300
Bunting Brass & Bronze Co., Cambridge, Mass.; bushings 2,484
C. & W. Tool Co., Cambridge, Mass.; reamers 2,025
Carnegie Illinois Steel Corp., Pittsburgh; steel 11,423
Carpenter & Paterson, Inc., Medford, Mass.; castings 4,139
Casco Products Corp., Bridgeport, Conn.; metal parts for primers. 100,908
Central Iron & Steel Co., Harrisburg, Pa.; floor plates 1,300
Chain Belt Co., Milwaukee; guns. 2,396,000
Chain Belt Co., Baldwin-Duckworth Division, Springfield, Mass.; chains 1,059
Chambersburg Engineering Co., Chambersburg, Pa.; anvil caps.. 1,795
Chapman Valve Mfg. Co., Indian Orchard, Mass.; hydrants 1,060
Chase Brass & Copper Co., Inc., Waterbury, Conn.; bands 35,319
Chase Brass & Copper Co., Inc., Waterbury, Conn.; brass rods. 1,226
Chicago Flexible Shaft Co., Chicago; feed mechanisms 636,988
Cincinnati Electrical Tool Co., Cincinnati; grinders 1,308
Cincinnati Milling Machine Co., Cincinnati; grinder cutters 3,036
milling machines 34,218
E. D. Clapp Co., Auburn, N. Y.; forgings 1,069
George P. Clark Co., Windsor Locks, Conn.; steel boxes 1,700
Cleveland Automatic Machine Co., Cleveland; machines 528,440
Cleveland Cutter & Reamer Co., Cleveland; milling cutters 1,289
Cleveland File Co., Cleveland; files 2,051
Cleveland Twist Drill Co., Cleveland; drills 1,680

Continental Motors Corp., Detroit; engines and parts 5,090,907
pullers 2,260
Continental Roll & Steel Foundry Co., Hubbard Steel Foundry Division, E. Chicago, Ind.; castings. 3,235
Continental Screw Co., New Bedford, Mass.; screws 7,000
Copper Range Co., C. G. Hussey & Co. Division, Pittsburgh; copper 1,040
Cornwall & Patterson Co., Bridgeport, Conn.; centrifugal pins .. 4,410
Covert Mfg. Co., Watervliet, N. Y.; buckles, barrel roller 1,300
Crescent Tool Co., Cincinnati; crimping machines 5,000
Crucible Steel Co., Harrison, N. J.; ammunition 3,144,582
steel 18,529
Curtis Mfg. Co., Curtis Saw Division, St. Louis; saws, cross-cut. 5,150
Defiance Machine Works, Inc., Defiance, Ohio; precision machines 253,068
Detroit Testing Machine Co., Detroit; testing machines 2,486
Diamond T Motor Car Co., Chicago; trucks 1,875
Henry Disston & Sons, Inc., Philadelphia; armor plates 2,311
steel 1,797
Duplex Printing Press Co., Battle Creek, Mich.; gun carriage parts 1,443,000
Easy Washing Machine Co., Syracuse, N. Y.; fuzes 750,000
Electric Products Co., Cleveland; motor generator sets 5,073
Essex Wire Corp., R-B-M Mfg. Co. Division, Logansport, Ind.; firing switch relays 1,092
Ex-Cell-O Corp., Detroit; grinding spindles and motor driving units 2,565
mills 2,940
Fedders Mfg. Co., Buffalo; metallic belt links 2,319,974
Federal Tool Corp., Chicago; gages 2,150
Firestone Steel Products Co., Akron, Ohio; metallic belt links .. 2,002,000
Fort Pitt Bedding Co., Pittsburgh; metallic belt links 396,882
Fox Munitions Corp., Philadelphia; thread rings 1,690
gages 1,834
Garman Tool & Die Co., Detroit; gages 30,686
General Electric Co., Pittsfield, Mass.; molds and fuze parts .. 3,078
General Electric Supply Corp., Schenectady; lighting fixtures.. 7,652
General Motors Corp., Detroit; shot 35,705,287
General Motors Corp., Oldsmobile Division, Lansing, Mich.; guns. 2,278,000
General Motors Corp., Olds Motor Works Division, Lansing, Mich.; ammunition 3,105,000
guns 2,768,300
General Motors Sales Corp., New Departure Division, Bristol, Conn.; ball bearings 62,122
Giebel Machine Tool Co., New York; lathes 7,550
Goddard & Goddard Co., Inc., Detroit; cutters 6,362
Gold Seal Electric Supply Co., Philadelphia; cable 1,001
Grainger-Rush Co., Boston; copper wire 1,054
Graybar Electric Co., Boston; conduits 1,897
Greenfield Tap & Die Corp., Greenfield, Mass.; gages 2,545
Greenlee Bros. & Co., Rockford, Ill.; sawing machines 4,772
Grenby Mfg. Co., Plainville, Conn.; grinders 2,680
Gries Reproducer Corp., New York; gages 1,326
Gries Reproducer Corp., New York; gages 1,028
Guiberson Diesel Engine Co., Chicago; hose clamps, etc. 2,041
Edwin F. Guth Co., St. Louis; projectiles 182,750
Haarmann Steel Co., Holyoke, Mass.; frames 2,214
Hadley Special Tool Co., Inc., Boston; gages 8,792
E. W. Haines, Upper Darby, Pa.; taps and drills 1,136
Louis Hanssen's Sons, Davenport, Iowa; levels, pliers and bobs .. 2,769
hoists 1,661
Harnischfeger Corp., Milwaukee; cranes and engineering services. 78,075
Hartford Electric Steel Corp., Hartford, Conn.; castings and pattern equipment 23,450
Hartford Special Machinery Co., spacing devices 1,268
Heald Machine Co., Worcester; grinding machines 283,415
Heller Bros. Co., Newark; files .. 3,956
Hendey Machine Co., Torrington, Conn.; lathes 45,702
Heppenstall Co., Pittsburgh; die blocks 5,900
High Speed Hammer Co., Inc., Rochester, N. Y.; head assemblies, spinning machines 1,421
Houdaille-Hershey Corp., Oakes Products Division, Detroit; lever assemblies 2,086
Howell Electric Motors Co., Howell, Mich.; electric motors 1,716
Illinois Gage Co., Chicago; gages. 18,365
Illinois Tool Works, Chicago; milling cutters 1,446
Industrial Spring Co., Chicago; parts for mounts, tripod 1,618
Ingersoll Milling Machine Co., Rockford, Ill.; cutters 1,150

International Business Machine Corp., Endicott, N. Y.; mechanism feeds 6,921
International Harvester Co., Inc., Davenport, Iowa; parts for heavy tractors 4,156
cranes 72,363
Iowa Transmission Co., Waterloo, Iowa; transmissions 9,842,000
B. Jahn Mfg. Co., New Britain, Conn.; dies 3,268
Johnson - Claflin Corp., Marlboro, Mass.; gages 2,194
Jones & Laughlin Steel Corp., Pittsburgh; steel 4,336
Kampa Mfg. Co., Milwaukee; windows and protectors 2,852
Kent Machine Co., Grand Rapids, Mich.; pneumatic presses 74,156
W. B. Knight Machinery Co., St. Louis; miller equipment 5,950
Landis Tool Co., Waynesboro, Pa.; grinding machines 621,054
LaSalle Steel Co., Chicago; steel. 1,032
R. K. LeBlond Machine Tool Co., New York; lathes 31,646
Lincoln Park Tool & Gage Co., Lincoln Park, Mich.; gages ... 7,921
Lincoln Tool & Die Co., Detroit; tools & fixtures 7,051
Link-Belt Co., Indianapolis; chain assemblies 4,302
Lloyd & Arms, Inc., Philadelphia; lathes 4,872



WOOD ROLLER CONVEYOR: Especially designed for handling explosives in ammunition and armament plants, this "sparkless" conveyor has rollers and frames of maple and brass. Bearings are either ball bearing or oiless bronze. The shafts and shaft holders are made of brass.

Logansport Machine, Inc., Logansport, Ind.; pneumatic presses .. 407,636
McCaskey Register Co., New Haven, Conn.; tool room equipment ... 2,256
McKenna Metals Co., Latrobe Pa.; lathe and turning tools 4,305
forming tools 3,910
Majestic Tool & Mfg. Co., Detroit; fixtures 1,250
Master Metal Products, Inc., Buffalo; accessories for tanks 2,664
Master Tool & Die Co., Newark; pins, barricades, and springs ... 4,660
Mergenthaler Linotype Co., Brooklyn; spotting boards 106,808
range quadrants 1,030,128
Merz Engineering Co., Indianapolis; gages and fin assemblies .. 3,220
Micromatic Hone Corp., Detroit; honing tools 3,050
Midvale Co., Nicetown, Philadelphia; forgings 180,557
Midwest Tool & Mfg. Co., Detroit; reamers 6,075
Miller Steel Sales, Philadelphia; floor plates 1,186
Millers Falls Co., Greenfield, Mass.; grinding heads 7,597
Mills Co., Cleveland; metal partitions 2,940
John E. Mitchell Co., Inc., Dallas, Tex.; projectiles 187,500
Modern Tool & Die Co., Philadelphia; gages 11,313
Monarch Aluminum Mfg. Co., Cleveland; funnels 7,855
lathes 360,343
Moore Special Tool Co., Bridgeport, Conn.; dies 4,305
Morton Mfg. Co., Chicago; ammunition chests 114,740
Motor Wheel Corp., Lansing, Mich.; ammunition 1,595,000
Munitions Mfg. Corp., Poughkeepsie, N. Y.; guns 4,266,000
National Acme Co., Cleveland; machines, automatic screw 68,929
National Stamping Co., Detroit; metallic belt links 2,264,610
National Tube Co., Ellwood City, Pa.; steel tubing, seamless 2,022
National Twist Drill & Tool Co., Detroit; milling cutters 1,609
New York Thread Grinding Corp., New York; gages 3,010
Nicholson File Co., Providence; files 3,549
Niles-Bement-Pond Co., Pratt & Whitney Division, W. Hartford; drilling machines 50,580
drill tips 7,290
Noblitt-Sparks Industries, Inc., Columbus, Ind.; ammunition 791,648

11-TON ANNEALING BOX: This special annealing box, for hardening metallic machine gun belt links, was fabricated and assembled in record time by Levinson Steel Co., Pittsburgh.

Norco Metal Products Co., Philadelphia; punches 2,424
Oliver Farm Equipment Co., Chicago; projectiles 322,905
Onsrud Machine Works, Inc., Chicago; lathes, shapers and borers 21,040
millers 5,850
Otis Elevator Co., Buffalo; castings 14,001
Otis Steel Co., Cleveland; steel .. 19,313
Parish Pressed Steel Co., Reading, Pa.; gun carriage parts 701,935
Park City Tool & Die Co., Bridgeport, Conn.; dies 1,230
Peerless Foundry Co., Bridgeport, Conn.; castings 1,592
Pennsylvania Tool & Mfg. Co., York, Pa.; gages and fin assemblies 6,500
Philadelphia Bronze & Brass Corp., Philadelphia; aluminum bronze rod, manganese 3,676
Phosphor Bronze Smelting Co., Philadelphia; phosphor bronze.. 4,267
Pipe Machinery Co., Cleveland; gages and fin assemblies 6,263
Fayette R. Plumb, Inc., Philadelphia; hammers and sledges 20,350
Potter & Johnston Machine Co., Pawtucket, R. I.; chucking machines 536,910
Precision Mfg. Co., Philadelphia; gages 1,544
Pringle & Brodie Machinery Co., Chicago; lathes 1,130
Ramsey Chain Co., Inc., Albany, N. Y.; castings 1,103
Revere Copper & Brass Co., Inc., Rome, N. Y.; forgings 39,950
W. S. Rockwell Co., New York; forge furnaces 15,151
Rockwood Sprinkler Co., Boston; fire prevention equipment 1,195
Rodgers Hydraulic, Inc., Minneapolis; presses, hydraulic 18,444
Roessler Machine Co., Philadelphia; punches 3,258
Rollway Bearing Co., Inc., Syracuse, N. Y.; bearings 1,539
Rotary Electric Steel Co., Detroit; steel 47,100
Joseph T. Ryerson & Son, Inc., Chicago; steel 1,559
SKF Industries, Inc., Philadelphia; ball bearings 2,321
Warren D. Sampson Co., W. Springfield, Mass.; snow loaders. 3,450
Seneca Falls Machine Co., Seneca Falls, N. Y.; drive plates, holders and lathes 2,432
Service Caster & Truck Co., Somerville, Mass.; steel hoppers 1,370
Sheehan Contracting Corp., Albany, N. Y.; excavation and regrading 1,962
Silent Hoist Winch & Crane Co., Brooklyn; capstans 5,112

Sipp-Eastwood Corp., Paterson, N. J.; plates, pins, fixtures 1,639
machines, thread cleaning 1,592
presses, pneumatic 484,070
Snap-On Tools Corp., Kenosha, Wis.; wrenches 12,205
Somerville Machine & Foundry Co., Somerville, Mass.; aluminum bronze castings 11,759
Springfield Stamp & Die Co., Springfield, Mass.; steel stamps. 6,486
Stamford Rolling Mills Co., Springdale, Conn.; brass 3,413
Standard Gage Co., Poughkeepsie, N. Y.; gages 8,116
Standard Pressed Steel Co., Jenkintown, Pa.; headers 11,885
Sterling Products Co., Moline, Ill.; hammers 2,140
Struthers-Wells Titusville Corp., Titusville Forge Division, Titusville, Pa.; forgings 215,625
Sutton Tool Co., Detroit; collets and feeders 13,855
Tate-Jones & Co., Inc., Leetsdale, Pa.; gas fired furnaces 4,906
Taylor Engineering Co., Elgin, Ill.; cylinders 24,600
Threadwell Tap & Die Co., Greenfield, Mass.; cutters 100,000
Thurston Mfg. Co., Frovidence; cutters 2,025

GOVERNMENT AWARDS

Timken Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis.; parts for tanks	4,837
differential assemblies	106,468
Timken Roller Bearing Co., Steel & Tube Division, Canton, Ohio; steel	18,451
Towmotor Co., Cleveland; trucks	3,539
Union Fork & Hoe Co., Columbus, Ohio; bayonets	548,049
Union Twist Drill Co., Chicago; cutters	3,891
Unique Specialties, Inc., New York; separators, punches, holders and sleeves	1,327
United Precision Products, Chicago; plug gages	3,388
U. S. Pipe & Foundry Co., Birmingham, Ala.; shells	90,687
Universal Fixture Corp., New York; steel shelving	1,620
Vinco Corp., Detroit; gages	8,781
Vulcan Mold & Iron Co., Latrobe, Pa.; molds	27,184
Wade Electric Products Co., Sturgis, Mich.; cartridge clips	357,000
George H. Wahn Co., Boston; electrical equipment	5,705
Ward LaFrance Truck Corp., Elmira Heights, N. Y.; parts for trucks	15,448
Warren Pipe Co. of Mass., Inc., Phillipsburg, N. J.; water piping equipment	1,151
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.; tools	352
Watson-Stillman Co., Roselle, N. J.; parts for presses	1,423
Weaver Mailing Envelope & Box Co., Philadelphia; mailing boxes	2,240
West & Dodge Thread Gage Co., South Boston; gages	1,202
Westinghouse Electric & Mfg. Co., Mansfield, Ohio; shot	2,336,450
Wheland Co., Chattanooga, Tenn.; guns	9,067,270
White Motor Co., Cleveland; wrenches; shackle assemblies and gaskets	3,070
fuel filters, etc.	7,471
Whitman & Barnes, Detroit; machine tools	336,632
D. E. Whiton Machine Co., New London, Conn.; cutting machines	8,800
Wiedemann Machine Co., Philadelphia; gages and fin assemblies	2,580
Willamette Hyster Co., Portland, Ore.; trucks	5,980
J. H. Williams & Co., Buffalo; forgings	1,660
wrenches	3,195
Wisconsin Steel Co., Chicago; steel bar	4,492
Wollaston Brass & Aluminum Foundry, N. Quincy, Mass.; castings	15,729
Alan Wood Steel Co., Conshohocken, Pa.; floor plates	1,512
Wood Shovel & Tool Co., Piqua, Ohio; shovels	1,808
Worthington Pump & Machinery Corp., Chicago; air compressors	25,420

War Dept., Corps of Engineers:

Central Foundry Co., New York; cast iron pipe and fittings	$77,256
Clifton & Applegate and Henry George, Spokane, Wash.; fence, Ft. George Wright, Spokane County, Wash.	14,913
Connors - Fidler Construction Co., Detroit; construction of motor repair shop, Selfridge Field, Mich.	33,750
Crane Co., San Francisco; plumbing and heating equipment	5,682
DeVilbiss Co., Toledo, Ohio; galvanized pressure feed tanks	2,296
Fairbanks, Morse & Co., Atlanta; pumps	11,923
Food Machinery Corp., Los Angeles; pumps	2,990
Gardner-Denver Co., Los Angeles; drill rods and rock bits	20,764

General Fire Truck Corp., New York; fire fighting equipment .. 2,364
Grinnell Co. of the Pacific, San Francisco; automatic sprinkler system, Bakersfield, Cal. 4,467
automatic sprinkler system, gardner Field, Cal. 4,705
automatic sprinkler system, Fresno Air Base, Fresno, Cal. .. 3,985
Harnischfeger Corp., Milwaukee; cranes, dragline attachments, shovel attachments, lighting plants and oil burning stoves .. 73,356
Hoefler & Stoecklein Co., Dayton, O.; concrete pipe and concrete culvert pipe 5,473
Hyman-Michaels Co., Los Angeles; rails, splice bars, tie plates, etc. 18,577
Ingersoll-Rand Co., New York; rock-drilling & blacksmith shop equipment 163,389
jackbits for wagon drills 83,570
parts for sharpeners, compressors and jackhammers 15,261
oil engine driven portable equipment 71,298
Keuffel & Esser Co. of N. Y., Chicago; drafting machines 3,539
Helen M. Killmaster, Oscoda, Mich.; dump trucks 8,865
Joseph Lehman Co., Inc., Brooklyn; smokejacks 5,771
Lyon Metal Products, Inc., Aurora, Ill.; steel shelving, Fairfax Aircraft Assembly Plant, Kansas City, Kan. 65,899
Mahoney-Clarke, Inc., New York; construction equipment and supplies 4,583
machine shop tools, equipment and supplies 11,732
welding supplies, hardware and tools 9,739
pumps and hardware items 2,672
Monarch Machine Tool Co., Sidney, Ohio; lathes 7,189
Morgan Steel Corp., Brooklyn; steel bars 5,817
Omaha Steel Works, Omaha, Neb.; test fixtures 2,340
Pacific States Cast Iron Pipe Co., Los Angeles; pipe and fittings. 4,925
Paulsen - Webber Cordage Corp., New York; cables 3,278
H. O. Penn Machinery Co., Inc., New York; construction equipment, etc. 72,359
tractors 20,602
Pomona Pump Co., New York, N. Y. Plant, Jersey City; pumping units 9,958
Rockwood Sprinkler Co. of Mass., Worcester; automatic sprinkler system, Scott Field, Ill. 24,844
Sterling Motors Corp., Long Island City, N. Y.; motor trucks and truck supplies 108,827
Webber Motor Car Co., Inc., Westwood, N. J., Plant, Jersey City; trucks and motors 5,167
Woodward Governor Co., Rockford, Ill.; turbine governors 61,935
York Midwest Corp., Kansas City, Mo.; refrigerators 2,196

War Dept., Air Corps:

Air conditioning & Refrigeration Supplies, Inc., Charleston, W. Va.; stand assemblies $165,100
American Steel & Wire Co. of N. J., Columbus, Ohio; cable .. 709
Bendix Aviation Corp., Bendix Products Division, South Bend, Ind.; tail wheel assembly parts. 140,149
Bird-White Corp., Chicago; vacuum pump assemblies 60,000
S. F. Bowser & Co., Inc., Ft. Wayne, Ind.; sight assemblies .. 166,181
Brochu & Hass Corp., Grand Rapids, Mich.; washers 10,428
Butcher & Hart Mfg. Co., Toledo, Ohio; washers 31,747
Butler Mfg. Co., Kansas City, Mo.; hangars, portable, prefabricated. 445,320
Circle Wire & Cable Corp., Maspeth, N. Y.; cable 14,418

Crosley Corp., Cincinnati; gun mount adapter assemblies 396,600
Curtiss - Wright Corp., Airplane Division, St. Louis Plant, Robertson, Mo.; parts for airplanes .. 176,064
Curtiss-Wright Corp., Curtiss Propeller Division, Caldwell, N. J.; propeller assemblies and controls 656,880
parts for propellers 502,691
parts for airplanes 861,620
George K. Garrett Co., Inc., Philadelphia; washers 43,334
General Motors Corp., Aeroproducts Division, Dayton, Ohio; propeller assemblies and tools 94,995
Graybar Electric Co., Inc., Dayton, Ohio; cable 88,500
Walter Kidde & Co., Inc., New York; cylinder assemblies 330,925
Lockheed Aircraft Corp., Burbank, Cal.; fuselage and bomb bay fuel tanks 57,737
C. & L. Marshall Co., Chicago; jewelers lathes 70,310
Roseman Tractor Mower Co., Evanston, Ill.; lawn mowers .. 249,200
Shakeproof, Inc., Chicago; washers 12,054
Sparks Withington Co., Jackson, Mich.; mooring kits 320,700
Warener Aircraft Corp., Detroit; aircraft engines 77,263
Wrought Washer Mfg. Co., Milwaukee; washers 73,179
Yale & Towne Mfg. Co., Stamford, Conn.; pump assemblies 252,500

War Dept., Signal Corps:

Anaconda Wire & Cable Co., New York; wire $179,510
Boice-Crane Co., Toledo, Ohio; drill presses 2,864
Collins Co., Collinsville, Conn.; axes 590
Commercial Metal Products Co., Chicago; motion picture cans .. 4,165
Cummins Diesel Engine Corp. of New York; power units 335,629
Diamond Wire & Cable Co., Chicago Heights; cord 540
Dicke Tool Co., Downers Grove, Ill.; cranks 707
General Electric Co., New York; cable 535
Gussack Machine Products, Inc., Long Island City, N. Y.; pullers 940
Maritime Electric Co., New York; fuses 508
May Hardware Co., Washington; vises, machinists' bench 577
Neumade Products Corp., New York; racks 6,305
Silent Hoist Winch & Crane Co., Brooklyn; cranes 5,870
Simplex Wire & Cable Co., Cambridge, Mass.; wire 7,289
Solar Mfg. Co., Bayonne, N. J.; capacitors 587
Stainless Metals, Inc., Long Island City, N. Y.; trays 2,400
Teletype Corp., Chicago; teletype sets 13,632
Tobe Deutschmann Corp., Canton, Mass.; capacitor units 500
Widin Metal Goods Co., Garwood, N. J.; mast bases and sections. 11,033
wire pikes 4,029
Yale & Towne Mfg. Co., New York; fuel pumps 1,135

War Dept., Medical:

American Sterilizer Co., Erie, Pa.; sterilizers $407,157
H. Dietz Co., Geo. & Arthur B. Koch, New York; tray sets 4,275
Griesbaber Mfg. Co., Chicago; knives 15,805
Hospital Supply Co. & Watters Laboratories, Cons., New York; sterilizers 144,116
MacGregor Instrument Co., Needham, Mass.; needles 15,002
Oneida, Ltd., Oneida, N. Y.; forceps 50,075
Penn Surgical Mfg. Co., Inc., Philadelphia; forceps 2,091
Scanlan-Morris Co., Madison, Wis.; combination, dressing and utensil sterilizers 207,742
Southern Equipment Co., St. Louis; vegetable steamers 697
Wilmot Castle Co., Rochester, N. Y.; sterilizers 172,443

New Lease Agreements

Washington

● ● ● **The DPC** has authorized the following lease agreements:

Cleveland Graphite Bronze Co., Cleveland, to provide machinery and equipment for a plant at Cleveland, to be used in the production of aeronautical equipment for the Navy Department, at a cost of $1,393,647.91.

General Ship & Engine Works, East Boston, Mass., to provide facilities to be used in the manufacture of vessels for the Navy Department at East Boston, at a cost of $210,000.

Genesee Tool Co., Fenton, Mich., to provide machinery and equipment for plant at Fenton, to be used in the production of ordnance equipment for the War Department, at a cost of $154,000.

Bendix Aviation Corp., Bendix Products Div., to provide machinery and equipment for plant at South Bend, Ind., to be used in the production of motor truck accessories for the War Department, at a cost of $128,180.

PERSONALS . . .

• **T. I. Phillips** has been elected a vice-president of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Phillips started as a tool maker in 1915 but was made a foreman within a year after joining the company. In 1930, he was appointed manager of the works department at the Nuttall plant of Westinghouse and three years later was made works manager for the company. His appointment as assistant to the president was made last February.

• **K. E. Dinius** has been appointed chief engineer of South Chicago works of Carnegie-Illinois Steel Corp. Before becoming associated with Carnegie-Illinois, Mr. Dinius was with the General Electric Co. in Fort Wayne, Ind. He went to South works in 1924 as a repairman in the electrical department and served in this capacity until 1929, when he was made testing engineer. In 1935 he became superintendent of the electrical department and a year later was transferred to the engineering department as an electrical engineer, the position he held until his present appointment.

• **Irving C. Eaton,** assistant engineer of the General Electric works laboratory at Bridgeport, Conn., since 1930, has been appointed engineer, succeeding **E. W. Schwartz,** who has resigned. A graduate of Massachusetts Institute of Technology in 1917, Mr. Eaton was at one time assistant to the superintendent of the Union Carbide Co. of Canada, Ltd., Welland, Ontario; assistant superintendent of Bird & Son, Inc., Phillipsdale, R. I., and works manager of the sheet division of the Fiberloid Corp., now Monsanto Chemical Co., at Indian Orchard, Mass. He is also vice-president of the Bridgeport Engineering Institute in charge of the department of chemistry and metallurgy.

• **J. W. McCartney,** who was assistant treasurer and general manager of the Harrison Bolt & Nut Co., Harrison, N. J., has been named general purchasing agent of the Sword Steamship Line, Inc., and the Marine & Maintenance Corp., Bayonne, N. J., a subsidiary. Mr. McCartney was connected

T. I. PHILLIPS, vice-president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

with Harrison Bolt & Nut Co. for 10 years and for the past year had been associated with the Sino Java Co., where he was in charge of purchasing for the Netherlands East Indian Government.

• **P. H. MacGregor,** for several years general manufacturing manager of Pontiac Motor division of General Motors Corp., has been named assistant to the general manager in charge of production for both automotive and defense activities. **Stanley Ostrander,** formerly general plant superintendent, becomes plant manager in charge of automotive production and **Robert H. Ahlers** continues as manager of defense production. **William Vann** has been advanced from chief inspector to assistant plant manager. **O. F. Marsal** has been promoted from general supervisor to chief inspector and **Ray Powers** becomes assistant chief inspector. **F. J. McLaughlin,** Pontiac purchasing agent, becomes assistant to the general manager in charge of all supplies both automotive and defense. **Fred Gordon,** formerly an assistant purchasing agent, becomes automotive purchasing agent, and **Martin Rummel** has been named assistant automotive purchasing agent. **L. Redford, Jr.,** continues as defense purchasing agent under Mr. McLaughlin, with **H. F. Decker** as assistant defense purchasing agent.

K. E. DINIUS, chief engineer of the South Chicago works of the Carnegie-Illinois Steel Corp.

• **W. S. Davis, Jr.,** assistant sales manager of Penola, Inc., Pittsburgh, since 1934, has been appointed manager, succeeding **D. V. Stonaker,** who retired on Nov. 1. Mr. Davis also has been elected a director and vice-president of the company, which is an industrial lubricants marketing affiliate of Standard Oil of New Jersey. Mr. Davis began his career in the petroleum industry as a laboratory assistant in the development department of the Standard Oil Company of New Jersey at Elizabeth, N. J., and three years later became a lubrication salesman at Trenton, N. J. In 1929, he joined the Standard Oil Company of Pennsylvania and advanced in various sales capacities to management of lubrication sales, which position he held for four years prior to his joining Penola as assistant sales manager.

• **H. H. Budds,** until recently general manager of the aircraft division of Briggs Mfg. Corp., has joined Fairchild Airplane & Engine Corp., New York, to direct the installation of mass production methods in the manufacture

of airplane engines. He is succeeded at Briggs by **George Drysdale.**

• **James J. Shea,** superintendent of the P. T. Kellogg division of the United States Envelope Co. since 1922, has been made president and general manager of the Milton Bradley Co., Springfield, Mass.; **W. O. Lippman,** of the East Springfield plant of the Westinghouse Electric & Mfg. Co., vice-president and assistant general manager, and **Raymond W. Keller,** assistant works manager. **Robert N. Ingersoll,** serving as president since October, 1940, is now chairman of the board.

• **Herbert H. Benfield** has been appointed New York district manager of the BullDog Electric Products Co. of Detroit. Mr. Benfield had been sales manager of the Steel Tubes division of Republic Steel Co.

• **A. J. Stromquist,** formerly safety inspector for the U. S. Bureau of Mines, has joined the Cleveland Cliffs Iron Co. in a similar capacity. He will have his headquarters in Ishpeming, Mich.

• **Edward P. Hamilton,** nephew of the late J. E. Hamilton, founder of the Hamilton Mfg. Co., Two Rivers, Wis., was elected president of the firm to succeed the late Harry C. Gowran. Mr. Hamilton had been vice-president in charge of manufacturing operations.

• **Steward McDonald** and **E. E. Tross** have been elected to the board of directors of the Federal Machine & Welder Co., Warren, Ohio.

• **J. M. Chapple** has been named in charge of the new Jacksonville, Fla., office of the Lincoln Electric Co., Cleveland. Mr. Chapple was formerly with the Detroit office of the company and for two and one-half years had been managing director of the Lincoln Electric Co., Pty. Ltd., in Alexandria, Australia.

• **John W. Smith** has been named vice-president-operating of the Boston & Maine and Maine Central Railroads and the Portland Terminal Co. **Frank W. Rourke** has been appointed general manager of the two railroads and the terminal company, and **F. W. Buckpitt** has been promoted to operating assistant, reporting to the general manager, of the three companies.

OBITUARY . . .

• **Everest William Buell,** assistant engineer of the wheel division of the Budd Wheel Co., Detroit, was found dead Nov. 16 in the woods near Grayling, Mich., apparently the victim of a hunting accident shortly after the opening of the deer hunting season. Mr. Buell had been associated with the Budd Wheel Co. for the last 12 years. He was graduated from the engineering college of the University of Michigan in 1915.

• **George F. Humphries,** who recently observed his 25th anniversary as traffic manager of the Dodge Brothers Corp., Detroit, died Nov. 18 of a heart attack. He was 71 years old.

• **George H. Broadhead,** a superintendent at Briggs Mfg. Co., Detroit, for the last 12 years, died Nov. 19. Mr. Broadhead was born in 1873 in Philadelphia and had lived in Detroit 26 years. For 14 of those years he worked at the Ford Motor Co. before joining Briggs.

• **Theodore Cox,** a chemist in the Detroit Testing Laboratories, died Nov. 17 after a brief illness, aged 33 years.

• **Enos A. Bates,** one of the pioneers in the automobile business, died recently. Mr. Bates became active in the promotion of the Rayfield carburetor in 1904 and was advertising manager and sales manager of Rayfield until 1922. He was 73 years old.

• **Thomas F. Daigle** died recently, aged 63 years. Mr. Daigle was president of the Daigle Iron Works.

• **Henry G. Vogel** died at his summer home in Gilford, N. H., Nov. 20. Mr. Vogel was first associated with the New York & New Haven Automatic Sprinkler Co., New Haven, and in 1890 organized his own business as the H. G. Vogel Co., New York.

• **Eugene L. Lebaron,** treasurer of the E. L. Lebaron Foundry Co., Brockton, Mass., died Nov. 21, at a local hospital. He was 72 years old.

• **Albert Quincy Dufour,** Wisconsin district manager for the Jeffrey Mfg. Co., Columbus, Ohio, died suddenly at his home in Milwaukee on Nov. 17. He was born in Pittsburgh and spent his youth in Gallipoli, Ohio, and got his first job with Jeffrey. In 1910 he went to Milwaukee as an engineer for the Chain Belt Co., later becoming a salesman for Jeffrey. He was 67 years old.

• **Vernon Clark,** a field service man for the Koehring Co., Milwaukee, for 20 years and well known in the road construction field, died of a heart attack at his home in Milwaukee Nov. 18 after having been in ill health for about a year.

• **Stuart Judson Marble,** manager of the industrial department, New York district sales of Revere Copper & Brass, Inc., died at the Gotham Hospital, Nov. 24, after a brief illness. He was 51 years old. After graduating from Meriden High School, Mr. Marble entered the employ of the New York office of the Chase Brass & Copper Co. In 1912 he became affiliated with the New York office of the Rome Brass & Copper Co. and later assumed the managership of that office.

• **John A. Chapman,** treasurer of Continental Gin Co., Birmingham, and associated with the company for 31 years, died at his home at Birmingham, Nov. 10. He was 57 years old.

• **Herman H. Carls,** superintendent of Pratt Mfg. Co., Coldwater, Mich., for 49 years, died recently. He was 74 years old.

• **Richard Atherton,** mechanical engineer for the Whitehead Metal Co., Cambridge, Mass., died at a Boston hospital Nov. 25. He was 32 years old and was graduated at Harvard University with the Class of 1933, and Stevens Institute of Technology in 1934.

• **William J. Lavelle,** former manager of the old New England Coal & Coke Co., Boston, was found dead in his automobile Nov. 27. He had been associated with the company for 26 years and had severed his connection in 1927 to engage in the insurance business. He was 60 years old.

• **Mortimore F. Dunn,** production supervisor for the Milwaukee Malleable & Grey Iron Works, Milwaukee, suffered a fatal heart attack at his home in Milwaukee on Nov. 25.

20 Plate Mills Operate at 124 Per Cent in October

• • • **Output of iron** and steel products during the first 10 months of 1941 totaled 50,677,975 net tons, with the October total reaching 5,470,830 net tons, according to the American Iron and Steel Institute.

The breakdown of October production shows that 20 companies making sheared and universal plates operated in October at 124.1 per cent of capacity, producing 592,822 tons. Thirty-two sheet manufacturing companies operated during that month at an average of 94.1 per cent, while hot rolled strip producers operated at 55.9 per cent and cold rolled strip producers at 84.6 per cent.

Production of steel for export during October totaled 532,082 net tons, and for the first ten months of this year totaled 4,696,165 tons.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

October - 1941
PERIOD

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons							
					Current Month				Year to Date			
					Total	Per cent of capacity	Shipments: Export	Shipments: To members of the industry for conversion into further finished products	Total	Per Cent of capacity	Shipments: Export	Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	42	1	xxxxxxx	668,144	xxx	216,266	181,684	5,736,350	xxx	1,621,225	1,735,666
	Heavy structural shapes	9	2	5,248,400	406,528	91.2	13,910	xxxxxxx	3,841,278	87.9	147,805	xxxxxxx
	Steel piling	4	3	422,000	28,121	78.4	2,013	xxxxxxx	294,856	83.9	28,568	xxxxxxx
	Plates—Sheared and Universal	20	4	5,624,360	592,822	124.1	26,085	5,351	4,819,712	102.9	281,836	34,716
	Skelp	8	5	xxxxxxx	83,716	xxx	8,384	43,078	848,478	xxx	133,780	357,121
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	140,963	45.9	11,925	xxxxxxx	1,454,613	48.3	61,229	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	16,027	62.3	2,343	xxxxxxx	146,803	58.2	50,741	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	3,577	41.3	456	xxxxxxx	22,823	26.9	3,007	xxxxxxx
	Splice bar and tie plates	14	9	1,299,600	50,661	45.9	1,254	xxxxxxx	586,811	54.2	12,702	xxxxxxx
	Bars—Merchant	41	10	xxxxxxx	563,212	xxx	24,295	60,103	5,330,571	xxx	385,224	631,105
	Concrete reinforcing—New billet	19	11	xxxxxxx	167,705	xxx	17,793	xxxxxxx	1,345,555	xxx	176,259	xxxxxxx
	Rerolling	19	12	xxxxxxx	30,690	xxx	2,139	xxxxxxx	209,240	xxx	13,887	xxxxxxx
	Cold finished—Carbon	25	13	xxxxxxx	107,102	xxx	2,622	xxxxxxx	1,050,944	xxx	21,277	xxxxxxx
	Alloy—Hot rolled	18	14	xxxxxxx	155,737	xxx	3,152	21,798	1,569,082	xxx	119,526	230,752
	Cold finished	19	15	xxxxxxx	21,805	xxx	1,923	xxxxxxx	159,642	xxx	25,173	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	9,641	xxx	510	xxxxxxx	98,346	xxx	3,519	xxxxxxx
	TOTAL BARS	65	17	13,317,725	1,055,892	93.3	52,434	81,901	9,763,380	88.0	744,865	861,857
	Tool steel bars (rolled and forged)	17	18	180,470	14,749	96.2	616	xxxxxxx	126,218	84.0	6,339	xxxxxxx
	Pipe and tube—B. W.	16	19	2,242,040	172,352	90.5	7,681	xxxxxxx	1,466,497	78.5	98,476	xxxxxxx
	L. W.	8	20	895,260	40,997	53.9	1,466	xxxxxxx	413,829	55.5	24,479	xxxxxxx
	Electric weld	6	21	551,020	48,582	103.8	4,678	xxxxxxx	455,845	99.3	27,468	xxxxxxx
	Seamless	15	22	2,997,160	221,404	86.9	15,308	xxxxxxx	1,830,815	73.3	158,252	xxxxxxx
	Conduit	8	23	174,140	15,619	105.6	524	xxxxxxx	134,502	92.7	4,038	xxxxxxx
	Mechanical Tubing	11	24	395,570	32,056	95.9	2,882	xxxxxxx	287,886	87.8	21,514	xxxxxxx
	Wire rods	22	25	xxxxxxx	117,263	xxx	15,311	17,872	1,262,510	xxx	165,279	210,138
	Wire—Drawn	39	26	2,230,290	211,640	111.7	9,291	1,614	1,897,984	102.2	118,652	18,823
	Nails and staples	18	27	1,153,930	66,027	67.3	3,935	xxxxxxx	664,929	69.2	57,216	xxxxxxx
	Barbed and twisted	16	28	474,210	24,728	61.4	12,223	xxxxxxx	230,607	58.4	58,914	xxxxxxx
	Woven wire fence	16	29	777,785	22,915	34.7	82	xxxxxxx	259,420	40.0	1,746	xxxxxxx
	Bale ties	11	30	110,970	7,134	75.7	124	xxxxxxx	70,651	76.4	295	xxxxxxx
	All other wire products	7	31	41,380	1,958	55.7	-	xxxxxxx	17,845	51.8	3	xxxxxxx
	Fence posts	12	32	122,165	4,588	44.2	188	xxxxxxx	59,068	58.0	982	xxxxxxx
	Black plate	11	33	340,030	45,578	157.8	5,935	-	370,084	130.7	34,600	43
	Tin plate—Hot rolled	7	34	515,620	44,067	100.6	18,028	xxxxxxx	294,118	68.5	52,596	xxxxxxx
	Cold reduced	11	35	3,542,040	298,252	99.1	40,920	xxxxxxx	2,582,343	87.5	246,623	xxxxxxx
	Sheets—Hot rolled	32	36	xxxxxxx	647,245	xxx	27,388	15,880	6,328,654	xxx	260,552	177,462
	Galvanized	16	37	xxxxxxx	123,957	xxx	5,777	xxxxxxx	1,416,086	xxx	91,149	xxxxxxx
	Cold rolled	18	38	xxxxxxx	234,481	xxx	11,621	xxxxxxx	2,596,561	xxx	67,284	xxxxxxx
	All other	13	39	xxxxxxx	62,706	xxx	2,102	xxxxxxx	649,619	xxx	19,752	xxxxxxx
	TOTAL SHEETS	32	40	13,369,740	1,068,389	94.1	46,888	15,880	10,990,920	98.7	438,797	177,462
	Strip—Hot rolled	24	41	3,285,430	155,897	55.9	5,345	20,289	1,697,633	62.0	63,835	210,647
	Cold rolled	38	42	1,525,510	109,658	84.6	3,841	xxxxxxx	1,092,364	86.0	21,721	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,820	26,769	74.5	695	xxxxxxx	217,178	61.7	2,153	xxxxxxx
	Axles	6	44	480,350	20,629	50.5	654	xxxxxxx	160,761	40.2	3,205	xxxxxxx
	Track spikes	11	45	325,770	14,958	54.0	397	xxxxxxx	143,637	52.9	3,205	xxxxxxx
	All other	8	46	96,600	5,839	71.1	-	xxxxxxx	41,700	51.8	79	xxxxxxx
	TOTAL STEEL PRODUCTS	163	47	xxxxxxx	5,838,499	xxx	532,082	367,669	54,284,448	xxx	4,696,165	3,606,473
	Pig iron, ferro manganese and spiegel	29	48	xxxxxxx	694,199	xxx	14,438	292,521	6,711,406	xxx	448,993	2,226,457
	Ingot moulds	4	49	xxxxxxx	62,629	xxx	459	xxxxxxx	625,397	xxx	3,707	xxxxxxx
Iron Products	Bars	13	50	175,915	9,408	62.9	184	551	83,402	56.9	990	4,563
	Pipe and tubes	3	51	109,300	6,682	72.0	185	xxxxxxx	57,895	63.6	2,316	xxxxxxx
	All other	1	52	56,000	2,089	43.9	438	-	16,381	35.1	3,404	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	14	53	276,715	18,179	77.3	807	551	157,678	68.4	6,710	4,563

During 1940, the Companies included above represented 97.9% of the total output of Finished Rolled Products.

Total Number of Companies Included - 186

The estimated average yield of products for sale from ingots produced by the companies included above is 71.1 *%, which applied to their total ingot capacity equals* 59,640,600 *net tons of finished rolled products. Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:*

Current month 5,470,830 *N. T.;* 108.0 *%*
Year to date 50,677,975 *N. T.;* 102.0 *%*

CONSTRUCTION STEEL

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings drop to 14,450 tons from 27,500 tons last week; new projects slightly higher at 14,650 tons.

NORTH ATLANTIC STATES
AWARDS

1900 Tons, Erie, Pa., General Electric Co., turbine shop No. 13, to Bethlehem Steel Co., Bethlehem, Pa.

913 Tons, Orange County, N. Y., State highway bridge, to American Bridge Co., Pittsburgh.

496 Tons, Niagara Falls, N. Y., titanium building for Vanadium Corp. of America, to Bethlehem Steel Co., Bethlehem, Pa.

430 Tons, Philadelphia Navy Yard, building 625 and extension 607, to Bethlehem Steel Co., Bethlehem, Pa.

300 Tons, Lester, Pa., Westinghouse Electric & Mfg. Co., power house, to Bethlehem Steel Co., Bethlehem, Pa.

335 Tons, South Boston, gun casements for U. S. Engineer office, to Bethlehem Steel Co., Bethlehem, Pa.

210 Tons, Kearny, N. J., four outriggers for dry dock, to American Bridge Co., Pittsburgh.

141 Tons, Washington, Tidal Basin bridge, to American Bridge Co., Pittsburgh.

1250 Tons, Norfolk, Va., five buildings for Navy, to Ingalls Iron Works Co., Pittsburgh plant, through Dry Dock Associates.

943 Tons, Clarendon and Orangeburg Counties, South Carolina, State highway bridge, to Vincennes Bridge Co., Vincennes, Ind.

600 Tons, Mobile, Ala., warehouse building No. 2 for Alabama Dry Dock & Shipbuilding Co., to Southern Steel Works Co., Birmingham.

410 Tons, Fort Worth, Tex., Tarrant County bridge, to North Texas Iron & Steel Co., Fort Worth, Tex.

204 Tons, Brantley and Pierce Counties, Georgia, highway bridge, to Virginia Bridge Co., Roanoke, Va.

200 Tons, Farner, Tenn., service bridge, TVA project, to Worden-Allen Co., Milwaukee.

CENTRAL STATES

3500 Tons, Warren, Ohio, extension for Copperweld Steel Co., to Bethlehem Steel Co., Bethlehem, Pa.

491 Tons, East St. Louis, Ill., extension to acid plant for Aluminum Ore Co., to Bethlehem Steel Co., Bethlehem, Pa.

370 Tons, Lacarne, Ohio, buildings for Lacarne proving ground, to Niles Forge & Mfg. Co., Niles, Ohio.

320 Tons, Kansas and Louisiana, bridges for Missouri Pacific Railroad Co., to American Bridge Co., Pittsburgh.

305 Tons, various locations, bridges for Missouri Pacific Railroad, to American Bridge Co., Pittsburgh.

243 Tons, River Rouge, Mich., repairs to ore bridge for Ford Motor Co., to Bethlehem Steel Co., Bethlehem, Pa.

160 Tons, Cincinnati, building for Southern Iron Works Co., to Carnegie-Illinois Steel Corp., Pittsburgh.

118 Tons, Licking County, Ohio, State highway bridge, to Case Crane & Kilbourne-Jacobs Co., Columbus.

WESTERN STATES

700 Tons, Las Vegas, Nev., transmission towers, to Emsco Derrick & Equipment Co., Los Angeles.

PENDING STRUCTURAL STEEL PROJECTS
NORTH ATLANTIC STATES

4090 Tons, Governors Island, New York, shafts and tunnels, contract No. 7, for New York Tunnel Authority.

2885 Tons, Watervliet, N. Y., arsenal buildings.

1417 Tons, Atlantic City, N. J., State bridge and approaches, route 56, section 1; bids Dec. 12.

1316 Tons, Quonset Point, R. I., seaplane hangar.

700 Tons, Bellevue, D. C., crane girders and rails for storehouse.

640 Tons, Philadelphia, aviation gasoline plant for Atlantic Refining Co.

530 Tons, Latrobe, Pa., building extension for American Locomotive Co.

192 Tons, Lowell, Mass., St. Joseph's Hospital addition.

130 Tons, New London, Conn., hospital, infirmary and classroom building; Tremagili Bros., Waterbury, Conn., low bidder.

120 Tons, Elmira, N. Y., Chemung County airplane hangar.

100 Tons, Boston, Navy Yard building addition.

THE SOUTH

705 Tons, Yancopin, Ark., girder spans for Missouri Pacific Railroad.

CENTRAL STATES

818 Tons, Meredosia, Ill., power house for Central Ill. Public Service Co.

215 Tons, Marion, Ill., kettle and pan house buildings, Illinois Ordnance plant.

130 Tons, various locations, bridge repairs for St. Louis San Francisco Railway.

WESTERN STATES

335 Tons, Coram, Cal., fixed wheel gates and hoists for Shasta Dam (Specification 1009); American Bridge Co., Denver, low bidder on gates, Williamette Iron & Steel Corp., Portland, Ore., only bidder on hoists.

184 Tons, Earp, Cal., bus structures Parker power plant (Specification 1586-D); American Bridge Co., Denver, low bidder.

127 Tons, Fort Lewis, Wash., water tanks and towers.

Pipe Lines

Arkansas-Louisiana Gas Co., 300 West Capitol Street, Little Rock, Ark., plans new welded steel pipe line from McKamie gas field, Lafayette County, Ark., to point near Beaton, Hot Spring County, Ark., close to 90 miles, for natural gas transmission for fuel at new mill of Aluminum Co. of America, Inc., at terminus noted. Project will include booster station, with control and distribution facilities at supply point. Company will operate in gas field area in conjunction with McKamie Gas Cleaning Co., recently organized joint subsidiary of Carter Oil Co., Tulsa, Okla., and Atlantic Refining Co., Philadelphia, which plans installation of plant for desulphurization of "sour gas" from McKamie field. Last noted plant will cost over $500,000. Aluminum company will install gas-fired boilers in new generating station at mill. Arkansas-Louisiana company is a subsidiary of Cities Service Co., New York.

General Purchasing Officer, Panama Canal, asks bids until Dec. 10 for 25,100 ft. of galvanized welded carbon steel pipe, and for 18,060 ft. of black copper-bearing welded steel pipe; also for 13,000 ft. of cement-lined cast iron water pipe, and 8805 ft. of cast iron soil pipe (Schedule 5757).

Village Council, Verona, Ohio, plans immediate installation of about 3000 ft. of 2-in. steel pipe for gas distribution system. George Steller, U-B Building, Dayton, Ohio, is consulting engineer.

Stanolind Oil & Gas Co., Philcade Building, Tulsa, Okla., plans new welded steel pipe line from oil field to oil refining plant near La Rosa, South Tex., for crude oil transmission to latter place. Cost over $350,000 with booster station and other operating facilities.

Hermiston, Ore., will take bids soon for about 35,000 ft. of 8, 6, and 4-in. steel pipe for water system; also for gate valves, fittings, etc. Cost about $96,134, of which $54,134 will be a Federal grant and remainder financed through loan. R. H. Corey, Bedell Building, Portland, Ore., is consulting engineer.

Cast Iron Pipe

Hamilton, Mass., has appropriated $60,000 for a water main extension.

Groton, Conn., this week will announce award for a $104,400 water main extension and other water system improvements.

Village Council, Grosse Pointe Woods, Mich., plans pipe lines for water system and other waterworks installation. Cost close to $100,000. Shoecraft, Drury & McNamee, Ann Arbor, Mich., are consulting engineers.

Village Council, Aberdeen, Ohio, plans pipe lines for water system and other waterworks installation. Cost about $40,000. Financing will be carried out through bond issue, recently approved, and Federal aid.

Elizabethtown, Ky., plans pipe line extensions and improvements in water system and other waterworks installation. Cost close to $93,300, of which $23,362 will be a Federal grant.

General Purchasing Officer, Panama Canal, Washington, asks bids until Dec. 8 for 8000 ft. of cement-lined cast iron water pipe (Schedule 5769); until Dec. 12 for couplings for 10-in. cast iron pipe, fittings, etc. (Schedule 5765).

Brownwood, Tex., plans pipe line extensions and replacements in water system, and other waterworks installation. Cost about $286,000, of which $156,000 will be a Federal grant, and $130,000 financed through Federal loan.

Orleans, Iowa, plans pipe lines for water system, including extensions in north and west parts of municipality, and replacements. Financing is being arranged through Federal aid.

Construction Quartermaster, Fort Leonard Wood, Mo., asks bids until Dec. 9 for approximately 17,600 ft. of 6-in. pipe for water lines.

Delaware River to Be Submarine "Proofed"

Philadelphia

• • • **Plans are being** completed by the Navy to make the Delaware River and Bay submarine proof through the use of heavy, steel-cable nets. Small sea-going ships will be stationed near the Philadelphia Navy Yard and at other strategic points to open the nets, permitting friendly boats to pass through.

These vessels are known as boom tenders, and four such ships are under construction at a Camden shipyard. One of these boats has been completed and is stationed at the Navy yard. Eight similar ships are being built in other shipyards at Atlantic and Pacific ports.

Reinforcing Steel

Awards of 6400 tons; 12,225 tons in new projects.

AWARDS

ATLANTIC STATES

500 Tons, Boston, Navy Yard building addition to Bethlehem Steel Co., Bethlehem, Pa.

230 Tons, Bellevue, D. C., Naval research laboratory two buildings, to Pollak Steel Co., Cincinnati.

200 Tons, Watertown, Mass., arsenal building, to Truscon Steel Co., Youngstown.

100 Tons, Naugatuck, Conn., government sponsored building for U. S. Rubber Co., to Ceco Steel Co., New York.

THE SOUTH

600 Tons, Bauxite, Ark., Aluminum Co. of America plant, to Truscon Steel Co., Youngstown.

CENTRAL STATES

700 Tons, Granite City, Ill., Granite City Steel Co. expansion, to Laclede Steel Co., St. Louis.

100 Tons, Whiting, Ind., Standard Oil Co. research laboratory, to Joseph T. Ryerson & Son, Inc., Chicago.

WESTERN STATES

1000 Tons, Keswick, Cal., Keswick Dam (Invitation A-33,422-A-1), to Colorado Builders Supply Co., Denver.

989 Tons, San Pedro, Cal., Rancho San Pedro housing project, to Blue Diamond Corp., Los Angeles, through Aetna Construction Co., Los Angeles, contractor.

700 Tons, Burbank, Cal., Vega Airplane Co. buildings 62 and 80, to Ceco Steel Products Co., Los Angeles.

300 Tons, Los Angeles, Pueblo Del Rio housing project, to Soule Steel Co., Los Angeles, through R. E. Campbell, Los Angeles, contractor.

165 Tons, Friant, Cal., Friant Dam (Invitation 48,902-A), to Colorado Builders Supply Co., Denver.

121 Tons, Marin County, Cal., Fort Cronkhite work, to Truscon Steel Co., Youngstown.

BRITISH WEST INDIES

350 Tons, St. Lucia, Army base, to Joseph T. Ryerson & Son, Inc., Chicago; Minder Construction Co., Contractor.

BRITISH GUIANA

200 Tons, Georgetown, Army base, to Joseph T. Ryerson & Son, Inc., Chicago.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1200 Tons, Connecticut, bars and mesh for six bridge and road projects.

500 Tons, Brooklyn, Navy Yard ordnance machine shop; John Lowry, Inc.

300 Tons, Indian Orchard, Mass., Chapman Valve Mfg. Co.; Stone & Webster Engineering.

197 Tons, Franconia, N. H., bridge, SN-FAP-238E(1).

150 Tons, Cumberland-Lincoln, R. I., State bridge.

143 Tons, Snyder County, Pa., highway project, route 25, sections 4, 5, and 6; bids Dec. 12.

100 Tons, New London, Conn., Coast Guard hospital, infirmary and classroom building.

THE SOUTH

4000 Tons, Pine Bluff, Ark., incendiary bomb plant; Sanderson & Porter, contractors.

3200 Tons, Alexandria, Va., residential development; Starrett Bros. & Eken, contractors.

CENTRAL STATES

120 Tons, Near Deerfield, Ohio, Berlin dam, U. S. Engineer; bids Dec. 18.

WESTERN STATES

800 Tons, Spokane, Wash., foundations for aluminum plant.

800 Tons, Troutdale, Ore., foundations for aluminum plant.

700 Tons, Los Angeles, foundations for aluminum plant.

Weekly Bookings of Construction Steel

Week-Ended →	Dec. 2, 1941	Nov. 25, 1941	Nov. 3, 1941	Dec. 3, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	14,450	27,500	6,900	14,625	1,230,370	1,074,461
Fabricated plate awards	0	1,625	0	1,655	136,845	142,130
Sheet steel piling awards	0	0	0	0	26,760	65,380
Reinforcing bar awards	6,400	6,550	6,750	5,600	671,055	442,495
Total letting of Construction Steel	20,850	35,675	13,650	21,880	2,065,030	1,724,466

MACHINE TOOLS

. . . SALES, INQUIRIES AND MARKET NEWS

Machine Rebuilders Helped By New Ratings for Parts

Cleveland

• • • **Rebuilders of machine tools** are considering their new ratings for parts to go into rebuilt machinery in the light of just how much relief will result. It is expected that the new rating will be very helpful on delivery dates on most items, particularly motors. In the meantime, the Washington Navy Yard has been soliciting rebuilders of used machinery on an assignment to overhaul 40 used machines.

So far as new machinery is concerned, scattered orders are being placed by recipients of contracts for the 4-lb. incendiary bomb. Moreover, business is near at hand as a result of the demolition bomb contracts recently announced.

Machine tool companies continue to lose labor in the unending interchange of employees that is now taking place as a result of the sky-rocketing of wages at certain defense plants. Two more recent cases that have come to the attention of THE IRON AGE include one where a machine tool shop employee of long standing who was receiving wages at the rate of $1.05 per hr., left his position to go with another concern which offered him $1.50 per hour. In another case a young worker with about eight months' experience, receiving a salary of 90c. per hour, was able to secure a position at $1.25 an hour as a turret lathe hand in a defense-jammed factory here.

Machines Await Small Tools

Chicago

• • • **In connection with** the huge $83,000,000 additional order for M-3 tanks divided between Pullman-Standard Car Mfg. Co. and Pressed Steel Car Co., very few machine tool purchases will be forthcoming. Both firms have done a splendid job of sub-contracting and will extend this procedure even more. This particular case is indicative of the general situation here as far as major machine purchases are concerned. The big jobs are all placed, a steady flow of small supplemental orders is maintained, and no new big contracts are in the offing—at least at present.

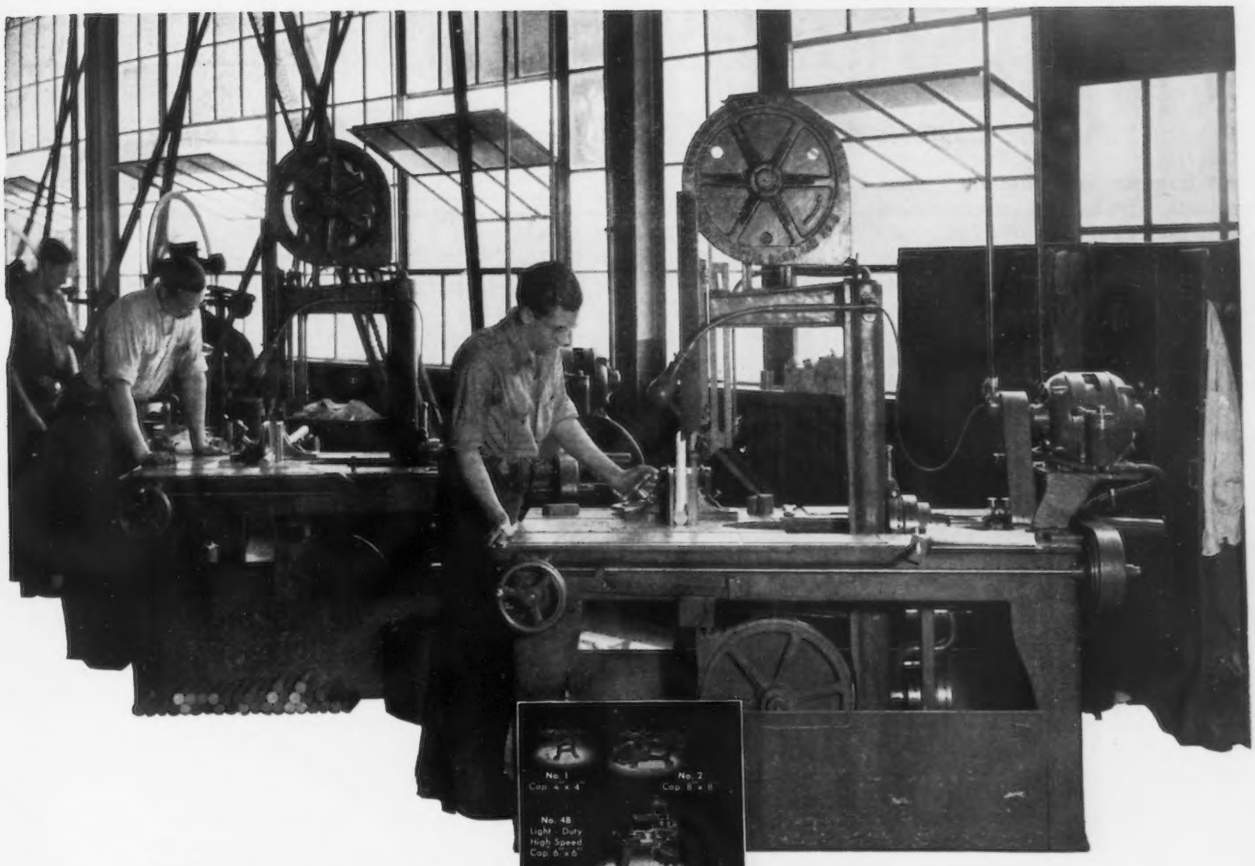
The job of tooling up is still the prime work here. The tank, gun, shell programs of size are all at that point where machinery is on the floor and as soon as tools, fixtures, etc., are ready the finished products will be coming out of the door. Two Navy jobs, one a 5 in. 50 cal. and the other a 4.7 in. 60 cal., will be ready for production soon. A number of secret, experimental orders for both navy and army are in process in the Chicago plants of some of the biggest companies. When they are ready for actual work, there will be another important call for new machines.

Price Controls Still Pending

Cincinnati

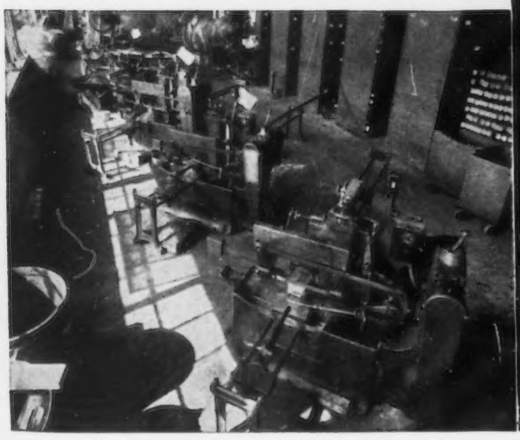
• • • **While reports of manufacturers** attending a price conference in Washington last week on finished machine tools indicate strong probability of a government price ceiling, the matter is still being taken under consideration. Discussion covered considerable territory, including various dates on which ceilings might be set, the question of labor and material costs and their relation to production. Production, of course, seems to be the serious problem in the whole question, because with a price ceiling on finished products, manufacturers will have to expend more time in obtaining materials within the price limits of their delivery quotations.

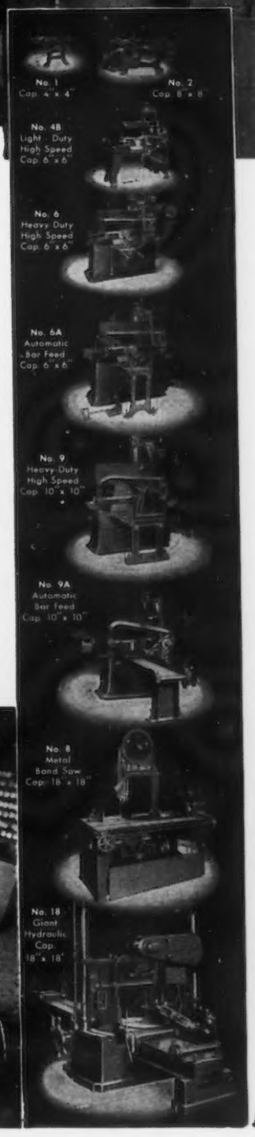
In the meantime, order books continue to swell as more and more equipment contracts flow into the market. Early fears of labor disruption through the operation of the Wright Aeonautical plant in this area have been allayed, since no great shift in plant personnel has developed, although employment is being regularly expanded.



Tool Makers know it takes good tools to make good tools

In almost every leading tool manufacturing plant, as in the Chicago plant illustrated here, they have standardized on MARVEL Metal Sawing Equipment. (Above: MARVEL No. 8 Metal Cutting Band Saws. Below, a battery of MARVEL No. 6A High Speed Production Saws.)





A COMPLETE SYSTEM OF METAL SAWING

The MARVEL System of Metal Sawing provides exactly suited saws for every shop or department. Included in the System are: Low priced dry-cutting general purpose shop saws; a light duty high speed shop saw; heavy duty, all-ball-bearing speed saws (the fastest saws built); heavy duty production saws with automatic bar push-up; versatile all-purpose metal cutting band saws of large capacity; a new giant hydraulic hack saw designed for the largest sizes and toughest alloys . . . and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago, U. S. A.

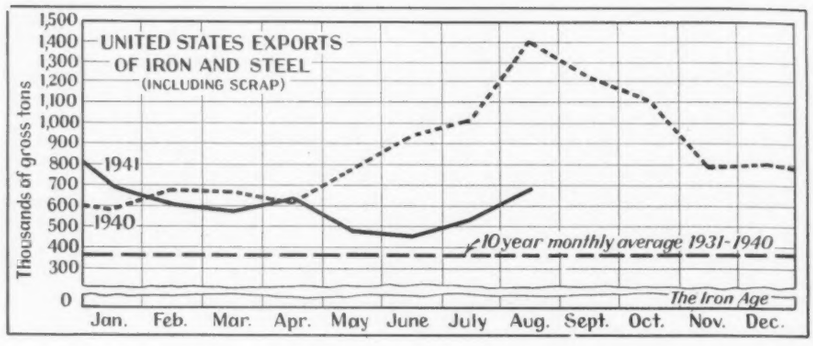
Eastern Sales: 225 Lafayette St., New York City

MARVEL SAWS

August Exports of Iron and Steel Increase to 697,732 Tons

• • • **Exports of iron** and steel products, including scrap, rose again in August, to 697,732 gross tons compared with 537,921 tons in July, according to the Department of Commerce. Exports for the eight months amounted to 4,668,201 tons against 6,683,494 tons in the comparable period of 1940.

August iron and steel imports increased to 1975 gross tons from 1631 tons in July. Imports of scrap rose 7000 tons over the July figure to total 16,405 tons in August.



IMPORTS
(Gross Tons)

August		Eight Months Ended August			EXPORTS (Gross Tons) August		Eight Months Ended August	
1941	1940	1941	1940		1941	1940	1941	1940
....	882	....	7,724	Pig iron	64,925	121,948	432,206	322,074
400	292	3,337	17,718	Ferromanganese and Spiegeleisen[1]	215	942	2,652	11,189
128	105	2,402	872	Ferrochrome and ferrosilicon[1]	*			
1	....	1	215	Other ferroalloys[1]	506	3,165	14,261	11,574
....	1	23	610	Sponge iron	*			
16,405	16	42,716	1,428	Scrap: iron, steel, tin plate	80,255	355,991	556,040	2,161,926
16,934	*1,296*	*48,479*	*28,567*	*Pig iron, ferroalloys and scrap*	*145,901*	*482,046*	*1,005,159*	*2,506,763*
60	....	117	440	Ingots, blooms, billets, sheet bars	217,563	342,641	965,061	1,236,623
*	....	....	....	Ingots, etc.: stainless, other alloy	24,322	6,390	272,163	29,370
*	....	....	....	Skelp	14,289	20,443	106,204	64,876
....	5	105	3,949	Wire rods	23,947	42,592	100,434	166,170
60	*5*	*222*	*4,389*	*Semi-finished steel*	*280,121*	*412,066*	*1,443,862*	*1,497,039*
1	11	45	113	Sheets, black iron and steel[2]	34,376	53,408	276,335	340,159
*	....	....	....	Sheets, galvanized iron and steel	7,660	13,125	70,109	116,073
*	....	....	....	Sheets, alloy steel	1,750	212	9,042	3,811
*	....	....	....	Sheets, stainless	110	146	769	1,215
40	1	49	10	Plates, plain and fabricated	28,274	79,883	270,407	341,876
*	....	....	....	Plates, alloy	2,343	194	7,969	1,719
*	....	....	....	Plates, stainless	15	66	184	331
95	43	299	1,795	Bars, merchant and reinforcing	25,770	83,009	312,463	414,538
....	....	15	194	Bars, iron[3]	582	732	2,811	10,418
*	....	....	....	Bars, alloy steel	9,141	2,718	54,212	19,072
*	....	....	....	Bars, stainless	98	40	475	609
7	10	160	854	Bars, hollow steel	*			
....	....	....	612	Hoops, bands, strips, cotton ties	11,981	22,688	100,276	128,253
*	....	....	....	Hoops, bands, strip: alloy steel	369	559	1,233	1,136
*	....	....	....	Hoops, bands, strip: stainless	66	129	362	571
*	....	....	....	Piling, sheet	374	425	4,463	8,968
9	19	61	710	Structural shapes	17,021	74,330	177,146	205,552
11	....	192	16	Structural material, fabricated[4]	3,031	5,035	36,286	49,174
....	6	69	78	Tin plate, terne plate, taggers' tin	33,038	20,610	171,024	318,734
*	....	....	....	Tanks, steel	1,100	3,523	14,328	19,799
....	....	....	31	Pipe, welded iron and steel	11,775	8,207	95,130	73,385
80	190	748	2,349	Casing and oil line pipe	14,160	10,993	98,478	126,101
*	....	....	....	Boiler tubes	5,064	2,013	38,667	15,622
1	43	29	849	Wire, round iron and steel, telephone	7,505	7,476	46,931	58,847
....	19	92	486	Wire rope, strand, other products	1,827	1,435	11,576	8,357
....	....	....	86	Wire barbed, woven products	5,606	6,666	44,306	30,089
493	396	2,173	2,009	Wire flat, all other types	12,395	11,460	81,672	87,732
1	2	23	106	Nails, tacks and staples	1,220	636	7,535	4,992
2	1	28	128	Bolts, nuts, rivets, washers, etc.	3,857	5,033	27,790	15,141
607	28	4,114	1,444	Rails and track material	11,990	80,916	126,702	167,987
1	....	9	12	Die blocks or blanks, etc.	*			
....	....	....	3	All other finished steel	1,880	1,901	20,691	14,557
1,348	*769*	*8,106*	*11,885*	*Rolled and finished steel*	*254,378*	*497,568*	*2,109,372*	*2,584,818*
....	....	....	419	Cast iron pipe and fittings	6,608	5,603	42,382	53,054
....	....	....	2	Malleable iron pipe fittings	494	277	3,378	2,932
38	35	223	433	Casting, forgings: iron and steel	6,575	4,819	42,178	23,686
*	....	....	....	Castings, forgings: alloy and stainless	1,239	312	5,603	3,757
*	....	....	....	Carwheels and axles	2,416	2,116	16,277	11,445
38	*35*	*223*	*854*	*Castings and forgings*	*17,332*	*13,127*	*109,818*	*94,874*
18,380	2,105	57,030	45,695	Total	697,732	1,404,807	4,668,201	6,683,494

[1] In imports the tonnage shown is the alloy content; the manganese, chromium and silicon content, as the case may be. [2] Imports include skelp and saw plate. [3] Import figure included iron slabs. [4] Imports include sashes and frames only.
* No separate figures.

NON-FERROUS METALS

. . . MARKET ACTIVITIES AND PRICE TRENDS

Zinc Pool 29%; Lead Set at 15%

• • • **Zinc pool** requirements for December were announced early this week as 29 per cent of their August production, a reduction of 2 per cent from the November requirements. This will amount to about 21,700 net tons available for allocation. Zinc oxide and dust producers need not set aside any material for pool purposes.

Simultaneously with the zinc pool announcement, OPM stated that lead refiners will be required to pool 15 per cent of December production for allocation. The percentage to be set aside is the same as for November, and will again amount to between 6000 to 6500 tons. Metal not allocated out of the pool for defense uses during December will be added to the government stockpile of lead.

Maximum prices for rolled zinc products, sheets, strip and plate, have been set by OPA. Sheet zinc prices are 13.15c. a lb., f.o.b. mill, with a quantity discount of 7 per cent for 36,000 lb. or more. The ribbon or strip zinc price ceiling was set at 12.25c. a lb., f.o.b. mill, with quantity discounts ranging from 1 to 7 per cent for shipments in lots ranging from 3000 to 36,000 lb. Likewise, ceiling prices were set on large and small plates, lithographers' and engravers' zinc plates. The prices take into consideration differentials between primary metal and finished products, as well as the increased volume of production in the industry. The prices have not been issued as official maximum prices by the OPA, and are not mandatory, but the approved prices are expected to assure a high level of production.

Tin interest this week was centered on the refusal of Thailand to sign a five year extension of the quota plan suggested by Great Britain and the Netherlands East Indies and the fact that Japanese-controlled French Indo-China is no longer a member of the cartel. The International Tin Committee, comprised of representatives of the major tin producing and consuming countries, stated that Thailand had rejected the production quota offered for the next five years and had submitted a number of alternative proposals that were unacceptable to the committee.

World production of tin, according to the Tin Research Institute, during October totaled 19,300 long tons, and production for the first 10 months of this year amounted to 205,200 tons, as compared to 187,600 tons in the first 10 months of 1940. Deliveries to United States totaled 8000 long tons in October, as compared to 12,715 tons in September.

The arrival of 5470 lb. of secondary pig aluminum at San Francisco from the Philippine Islands marked the first importation of critical metal from overseas departments of the Army. Further shipments of aluminum, scrap iron and other scrap metals are expected to follow this shipment as quickly as the Quartermaster Corps can make arrangements for their handling from the Islands.

Average prices of the major non-ferrous metals during the month of November, based on quotations appearing in THE IRON AGE, were as follows:

	Cents per Lb.
Electro copper, Conn. Valley	12.00
Lake copper, east. delivery	12.00
Straits tin, spot, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65
Lead, St. Louis	5.70
Lead, New York	5.85

SCRAP

. . . MARKET ACTIVITIES AND PRICE TRENDS

Price Cracks Widen As Supplies Tighten

• • • **Testifying** to the seriousness of the iron and steel scrap supply problem, most stubborn obstacle of the whole defense endeavor, cracks in the government price ceilings appeared widening in several areas last week.

Violations are most numerous where the greatest shortages exist, for example, the Pacific Coast where premiums as high as $15 per ton over the established ceilings have been paid. The OPA and scrap buyers and sellers are devoting much thought to possible methods of correcting evils. Dealers have urged that prices be based on the most advantageous basing point instead of the nearest basing point. Buyers for steel companies this week presented their views on quickening the flow of material.

At Chicago, Inland Steel Co. closed four open hearths for lack of scrap. This forced OPM to issue allocation orders Monday, directing shipments to Inland from seven dealers in the Chicago district but since the scrap had not actually been received no definite plans had been made Tuesday for resumption of the idle furnaces. Inland said it hoped the allocation would enable maintenance and improvement of present operations.

Current reports from other principal scrap centers indicate inventories at consuming plants are well below the 5 weeks' average supply level indicated by the Bureau of Mines in its latest report, covering the period ending Aug. 31.

Imports of scrap from the Philippines and from Cuba are being spurred.

52 Million Tons Probable 1941 Scrap Consumption

• • • **Consumption of** iron and steel scrap in October, at 4,649,000 gross tons, fell just short of the all-time record of 4,662,000 gross tons set in March, 1941, according to the Institute of Scrap Iron & Steel, Inc., Washington. The October figure represented a moderate increase over the 4,392,000 tons consumed in September and the 4,233,000 tons melted in October, 1940.

In the first ten months of 1941 total consumption is estimated by the Institute at 44,507,000 gross tons, compared with 33,815,000 tons in the comparable period of 1940, and 24,963,000 tons in the like period of 1939.

"There is every indication that 1941 consumption of home and purchased scrap will approximate 52,000,000 gross tons, exceeding by a wide margin the previous record of 41,687,000 tons in 1940 and the first World War banner year, 1917, of 26,800,000 tons," said Edwin C. Barringer, executive secretary of the Institute.

Scrap Stocks Sept. 1 Show Slight Drop; Use Increases

Washington

• • • **Marking a decline** of 3 per cent, domestic stocks of iron and steel scrap at consumers' and suppliers' plants and in transit at the end of August approximated 6,002,000 net tons, compared with 6,208,000 tons reported on July 31, according to the Bureau of Mines. The known stocks held by consumers and suppliers at the end of August were equivalent to a five-weeks' supply at the rate of consumption in that month, a position unaltered from that at the end of July. Stocks on hand and in transit to consumers' plants at the end of August were 4,814,000 tons, a decline of 2 per cent from 4,911,000 at the end of the preceding month, but suppliers' stocks declined 8 per cent to 1,188,000 tons at the end of August from 1,297,000 at the end of July.

The major portion of this decline was attributable to a decrease

in dealers' stocks which were 10 per cent less at the end of August than on July 31, with auto wreckers' and railroads' stocks decreasing 5 and 10 per cent, respectively, while manufacturers' stocks increased 20 per cent.

Other highlights of the report are:

Stocks at end of August—purchased scrap, 4,498,000 net tons; home scrap, 1,504,000 tons; pig iron, 1,940,000 tons. Consumption during August—purchased scrap, 2,347,000 tons; home scrap, 2,792,000 tons (total, 5,139,000 tons vs. 5,026,000 in July); pig iron, 4,822,000 tons. Regional stocks of home and purchased scrap, in terms of August rate of consumption—western Pennsylvania, 4 weeks; eastern Ohio and West Virginia, 4 weeks; New England, 11 weeks; western states, 10 weeks; southwestern states, 24 weeks.

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PITTSBURGH—Preliminary and unofficial reports on scrap inventories indicate some plants have only a few days' supply at the current rate of operation. Brokers of long standing claim privately that direct deals between steel companies and originators of scrap have been so frequent and involved so much tonnage that the brokerage business in some instances has suffered a decline of as much as 75 per cent. Others insist they are being driven out of business because of these direct transactions. In some of the deals it is said that the basis used for bargaining is the sale of new steel in return for which scrap is to be supplied.

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CHICAGO—Inland Steel Co. has closed four open hearths, three of which went down last week for repairs and were not reopened because of a low scrap supply. The fourth went off at the start of this week. OPM began allocating material Monday to the company. Inland's operations are 8 to 10 per cent lower than the average of the past several months. Some mills have only 10 days' supplies. The few who have 30 to 45 days fear losses by allocation.

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DETROIT—Arrangements have been made to bring scrap into the United States from Cuba. A Detroit brokerage firm, Samuel G. Keywell Co., Inc., has just completed a deal that would permit such imports to be made. The scrap to be brought in is understood to consist of country scrap and some bundles and railroad scrap.

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CLEVELAND—The situation continues gloomy for Ohio mills, although some foundries are reported to be laying in heavy inventories to safeguard them against allocations if and when they are imposed. Allocations continue to be made to steel mills working on defense orders.

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BOSTON—Scrap is not coming out faster despite government appeals. Supplies are actually decreasing. The Washburn Wire Co. and the American Steel & Wire Co. need No. 1 and No. 2 steel. The Worcester plant has obtained some railroad scrap.

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CINCINNATI—Although reports have not been made on scrap conferences at Washington during the past week, dealers indicated that simplification of schedules to make material available on an equal basis is under way. In the meantime, the hand-to-mouth situation in the local market remains unchanged.

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BIRMINGHAM—No increase in the flow of scrap has occurred here and a serious shortage still prevails in all grades.

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BUFFALO—The possibility that any of the seven open hearths inactive at Bethlehem's Lackawanna plant because of lack of scrap may be relighted before next Spring is said to be very remote. Two lake carriers brought 10,000 tons of scrap from Duluth to Bethlehem's docks in the past week.

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ST. LOUIS—Receipts of scrap in the St. Louis industrial district continue extremely light. Steel mill operations have not been affected yet although the situation is still critical. Railroad offerings to brokers are small.

Iron and Steel Scrap (other than railroad scrap)

(Maximum basing point prices as revised by OPA to Nov. 25, 1941, from which shipping point prices and consumers' delivered prices are to be computed, per gross ton)

Basing Points → / ▼ GRADES	Pittsburgh	Johnstown, Welrton, Steubenville, Youngstown, Warren, Sharon, Canton	Chicago	Kokomo	Bethlehem	Claymont, Coatesville, Phoenixville, Harrisburg, Conshohocken	Sparrows Point	Buffalo	Cleveland	Toledo	Cincinnati*, Portsmouth, Middletown, Ashland	St. Louis††	Detroit	Duluth, Min'apolis**	Alabama City†, Atlanta††, Birmingham	Chattanooga	Radford, Va	Worcester, Bridgeport, Phillipsdale, R. I.	Seattle	Los Angeles, San Fr'c'o***, Pittsb'g, Cal.	M'nequa, Colo., Portland, Ore.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.25	$19.50	.....	$19.50	$17.50	$17.85	$18.00	$17.00	.....	.....	.....	$14.50	$17.00	16.50
No. 1 hyd. comp. black sheet	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.25	19.50	.....	19.50	17.50	17.85	18.00	17.00	.....	.....	.....	14.50	17.00	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	(See	13.50	16.00	15.50
Dealers' No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	foot-	13.50	16.00	15.50
Dealers' No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.25	17.50	.....	17.50	15.50	15.85	16.00	15.00	.....	.....	notes)	12.50	15.00	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.50	14.75	13.10	14.75	12.75	13.10	.....	12.25	.....	.....	.....	9.75	12.25	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	14.75	15.00	13.35	15.00	13.00	13.35	15.50	15.00	Alloy, ...	W.Va. 17.60	.....	10.00	12.50	12.00
Shoveling turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	15.75	16.00	14.35	16.00	14.00	14.35	16.50	16.00	.....	.....	.....	11.00	13.50	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	18.75	19.00	.....	19.00	17.00	17.35	17.50	16.50	.....	.....	.....	14.00	16.50	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	14.75	15.00	.....	15.00	13.00	13.35	13.50	12.50	.....	.....	.....	10.00	12.50	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.00	15.25	13.60	6 15.25	13.25	13.60	13.75	12.75	.....	.....	.....	10.25	12.75	12.25
Uncut structural, plate scrap	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	.....	13.50	16.00	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	20.00	22.00	.....	21.00	20.00	20.35	19.00	20.00	20.50	21.00	22.00	18.00	19.50	18.00
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	18.50	20.50	.....	19.50	18.50	18.85	17.50	18.50	19.00	19.50	20.50	17.00	18.00	16.50
Stove plate	19.00	5 19.00	17.00	16.00	18.00	18.50	18.00	19.00	18.00	15.60	17.50	17.00	14.10	16.00	17.00	17.50	18.00	17.50	14.00	16.50	15.00
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.25	24.50	.....	24.50	22.50	22.85	23.00	22.00	.....	.....	.....	19.50	22.00	20.50
Low phos. bar crops, smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.25	22.50	.....	22.50	20.50	20.85	21.00	20.00	.....	.....	.....	19.50	20.00	18.50
Low phos. pu'ch'gs, plate scrap[1]	24.75	23.00	21.75	21.75	21.25	21.75	21.75	22.25	22.50	.....	22.50	20.50	20.85	21.00	20.00	.....	.....	.....	17.50	20.00	18.50
Machinery cast, cupola size[2]	22.00	22.00	21.00	21.00	23.50	24.00	23.50	21.00	23.00	.....	22.00	21.00	21.35	20.00	21.00	21.50	22.00	23.00	19.00	20.50	19.00
No. 1 mach. cast, drop-broken, 150 lb. and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	21.50	23.50	.....	22.50	21.50	21.85	20.50	21.50	22.00	22.50	23.50	19.50	21.00	19.50
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	21.50	23.50	.....	22.50	21.50	21.85	20.50	21.50	22.00	22.50	23.50	19.50	21.00	19.50
Punchings and plate scrap[3]	23.75	22.00	20.75	20.75	20.25	20.75	20.75	21.25	21.50	.....	21.50	19.50	19.85	20.00	19.00	.....	.....	.....	16.50	19.00	17.50
Punchings and plate scrap[4]	22.75	21.00	19.75	19.75	19.25	19.75	19.75	20.25	20.50	.....	20.50	18.50	18.85	19.00	18.00	.....	.....	.....	15.50	18.00	16.50
Heavy axle, forge turnings	21.25	19.50	18.25	18.25	17.75	18.25	18.25	18.75	19.00	.....	19.00	17.00	17.35	17.50	16.50	.....	.....	.....	14.00	16.50	15.00
Medium h'vy el f'ce turnings	19.75	18.00	16.75	16.75	16.25	16.75	16.75	17.25	17.50	.....	17.50	15.50	15.85	16.00	15.00	.....	.....	.....	12.50	15.00	13.50

[1] This grade is ⅝-in. and heavier, cut 12 in. and under. [2] May include clean agricultural cast. [3] Under ⅝ to ¼-in., cut 12 in. and under. [4] Under ¼-in. to No. 12 gage, cut 12 in. and under. [5] Youngstown, Warren, Sharon and Canton are not basing points on this grade. [6] Middletown and Cincinnati price for this grade is $15. * Includes Newport, Ky. Shipping point price within Cincinnati basing point may be 80c. a ton below basing point price listed above for all grades except the six cast grades. ** Minneapolis and St. Paul are basing points on following grades only: No. 1 cupola, heavy breakable cast, stove plate, machinery cast cupola size, No. 1 machinery cast drop broken, clean auto cast. † Alabama City, Ala., is basing point only on No. 1 heavy melting; No. 1 compressed black sheets; No. 2 heavy melting; dealers' No. 1 and No. 2 bundles, mixed borings and turnings; machine shop turnings; shoveling turnings; No. 1 and No. 2 busheling; cast iron borings; uncut structural and plate scrap. †† Atlanta is basing point only on No. 1 and No. 2 heavy melting; No. 1 compressed black sheets; No. 1 and No. 2 dealers' bundles. ††† St. Louis basing point includes the switching district of Granite City, East St. Louis, and Madison, Ill. *** The San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland.

Railroad Scrap *(Per gross ton, delivered consumers' plants located on line of railroad originating scrap)*

Basing Points → / ▼ GRADES	Pittsburgh, Sharon, Pa., Wheeling, Steubenville, Youngstown, Canton	Chicago	Kokomo	Philadelphia	Wilmington	Sparrows Point	Cleveland	Buffalo	Portsmouth, Middletown, Ashland	St. Louis	Kansas City	Cincinnati	Detroit	Duluth	Birmingham	Seattle	Los Angeles, San Francisco
No. 1 heavy melting	$21.00	$19.75	$19.25	$19.75	$19.75	$19.75	$20.50	$20.25	$20.50	$18.50	$17.00	$20.50	$18.85	$19.00	$18.00	$15.50	18.00
Scrap rails	22.00	20.75	20.25	20.75	20.75	20.75	21.50	21.25	21.50	19.50	18.00	21.50	19.85	20.00	19.00	16.50	19.00
Rerolling rails	23.50	22.25	21.75	22.25	22.25	22.25	23.00	22.75	23.00	21.00	19.50	23.00	21.35	21.50	20.50	18.00	20.50
Scrap rails 3 ft. and under	24.00	22.75	22.25	22.75	22.75	22.75	23.50	23.25	23.50	21.50	20.00	23.50	21.85	22.00	21.00	18.50	21.00
Scrap rails 2 ft. and under	24.25	23.00	22.50	23.00	23.00	23.00	23.75	23.50	23.75	21.75	20.25	27.75	22.10	22.25	21.25	18.75	21.25
Scrap rails 18 in. and under	24.50	23.25	22.75	23.25	23.25	23.25	24.00	23.75	24.00	22.00	20.50	24.00	22.35	22.50	21.50	19.00	21.50

Railroads not operating in a basing point may sell rerolling rails f.o.b. their lines at average price of their sales from Sept. 1, 1940, to Jan. 31, 1941. Rerolling mills may absorb all transportation charges necessary to obtain such rails. Maximum prices for scrap rails and rerolling rails from mines, logging camps and similar sources need not be sold for less than $13.50 a gross ton for scrap rails and $15 for rerolling material at shipping point.

Where the railroad originator of the scrap operates in two or more of the basing points named, the highest of the maximum prices established for such basing points shall be the maximum price of the scrap delivered to a consumer's plant at any point on the railroad's line, except that switching charges of 84c. per gross ton shall be subtracted from the maximum prices of scrap originating from railroads operating in Chicago and sold for consumption outside Chicago.

Explanatory Notes

(A basing point includes its switching district)

MAXIMUM PRICE at which any grade of scrap may be delivered to consumer's plant, wherever located, is the shipping point price, plus actual transportation from the shipping point to consumer. Where shipment is by water, actual handling charges at the dock of not more than 75c. a gross ton may be included as part of transportation charges. In no case may this maximum price exceed by more than $1 prices (for material other than railroad scrap) for the basing point nearest the consumer.

COMPUTING SHIPPING POINT PRICE: A shipping point is the point from which the scrap is to be shipped to a consumer. A shipping point price is computed as follows: (a) For Shipping Points located within a basing point.—The price established for the basing point in which the shipping point is located, is determined. Then deduct from this the actual costs involved in transporting scrap from the shipping point to the consumer's plant within the basing point which is nearest, in terms of transportation costs, to the shipping point; (b) For shipping points located outside a basing point.—The price established for the nearest basing point, in terms of transportation charges, to the shipping point is determined. Deduct from this the lowest established charge for transporting scrap from the shipping point to such basing point. *Exceptions:* (1) The shipping point price at any shipping point in New England, of those grades of scrap for which no prices are listed above shall be the Johnstown basing point price, minus the all-rail transportation costs from the New England shipping point to Johnstown; (2) Shipping point prices for New York City, Brooklyn, New York, and New Jersey shall be computed from the Bethtlehem, Pa., basing point.

GULF PORT PRICES: Scrap shipped from Tampa, Pensacola, Gulfport, Mobile, New Orleans, Lake Charles, Port Arthur, Beaumont, Galveston, Texas City, Houston and Corpus Christi, has a maximum shipping point price not exceeding $14 a gross ton, f.o.b. cars, for No. 1 heavy melting steel. For other grades, the differentials established for Birmingham apply.

REMOTE SCRAP: Defined as all grades of scrap listed in table above (exclusive of railroad scrap) located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas and Oklahoma. Maximum shipping point price of remote scrap is $12 a gross ton, for No. 2 heavy melting steel, with differentials for other grades the same as differentials established in table above for St. Louis. The maximum delivered price of remote scrap is the shipping point price, plus actual transportation charges, except that when necessary to absorb transportation charges, the maximum delivered price may be exceeded by a maximum of $4 a ton. Thus the maximum delivered price for remote scrap may exceed the price for the nearest basing point by $5. In the event that an allowance in excess of $5 a ton is necessary to acquire a tonnage of remote scrap, a consumer may apply to OPA for permission to exceed the $5 allowance. Purchases under these remote scrap provisions must be for not less than one car a month and must be reported in detail. Provisions of this remote scrap section expire Dec. 31, 1941.

BROKER COMMISSIONS: A commission of up to 50c. a ton above the maximum prices is allowed to brokers.

*OPA maximum for sale by dealer. **Nominal.

UNPREPARED SCRAP: Regardless of source, maximum price of unprepared scrap is $2.50 less than maximum for corresponding grade of prepared scrap.

BILLET AND BLOOM CROPS: Where such material originates in the Pittsburgh basing point, it may be sold delivered to a consumer within or without the Pittsburgh point at the price given in Schedule 'A, plus not more than $2.50 in transportation charges. Lowest established transportation charges will govern.

Non-Ferrous Scrap

(Dealers buying prices, cents per lb.)

	New York	Philadelphia	Pittsburgh	Cleveland	Detroit	Chicago
No. 1 hvy. copper	*10.00	*10.00	*10.00	*10.00	*10.00	*10.00
Light copper	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00
Hvy. yel. brass	6.25-6.50	**6.25	7.50-8.00	5.75-6.25	7.00-7.25	7.50
Light brass	5.25-5.50	**5.50	7.00-7.25	6.00-6.50	6.50-6.75	7.00 7.25
No. 1 Comp. turn.	8.75-9.00	**7.75	**9.00-9.25	8.50-9.00	9.00-9.25	9.00 9.25
New brass clips	8.00-8.25	8.50-9.00	7.75-8.00	8.00-8.50	7.50-8.00	7.75 8.25
Soft lead	5.25-5.50	5.00-5.25	4.75-5.00	4.75-5.00	5.00-5.25	4.75-5.00
Old zinc	4.00-4.25	4.25	4.25-4.50	4.00-4.50	4.25-4.50	4.50 5.00
Cast, forged alum.	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Old sheet alum.	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Solder joints	8.75-9.00	9.00	7.50-8.00	6.50-6.75	5.50-6.00	7.50-8.00
No. 1 pewter	35.00-36.00	35.00-36.00	31.00-32.00	32.50-34.00	37.50-38.50	32.80-34.00

* OPA maximum for sale by dealer. ** Nominal.

. . . Comparison of Prices

(Advances Over Past Week in **Heavy Type**; Declines in *Italics*)

(Prices Are F.O.B. Major Basing Points)

	Dec. 2, 1941	Nov. 25, 1941	Nov. 3, 1941	Dec. 3, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	Dec. 2, 1941	Nov. 25, 1941	Nov. 3, 1941	Dec. 3, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	31.34	30.34
Ferromanganese‡	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$22.25
Heavy melt'g steel, Phila.	18.75	18.75	18.75	20.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	20.50
No. 1 hy. com. sheets, Det.	17.85	17.85	17.85	18.00
Low. phos. plate, Youngs'n	23.00	23.00	23.00	24.00
No. 1 cast, Pittsburgh	22.00	22.00	22.00	22.25
No. 1 cast, Philadelphia	24.00	24.00	24.00	23.25
No. 1 cast, Ch'go*	21.00	21.00	21.00	18.75

*Changed to gross ton basis, April 3, 1941.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$6.125	$5.25
Foundry coke, prompt	6.875	6.875	6.875	5.75
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	50.20
Zinc, East St. Louis	8.25	8.25	8.25	7.25
Lead, St. Louis	5.70	5.70	5.70	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in detailed price tables, pages 140-146.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

. . . Composite Prices

FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 2, 1941 ..... 2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago ..... 2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago ..... 2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago ..... 2.30467c. a Lb.	$22.61 a Gross Ton	$21.17 a Gross Ton

	High	Low	High	Low	High	Low
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

A weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip. These products represent 78 per cent of the United States output. This revised index recapitulated to 1929 in the Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢			
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10						$5.32
BLACK PLATE															
29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			3.37¢
TERNES M'FG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont = 2.10¢)							
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢(11)		2.45¢	2.65¢	2.25¢	2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.37¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.80¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed. [11] Ship plates only.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2 higher; f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel, f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Alloy Steel Blooms, Billets and Slabs

	Per Gross Ton
Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem	$54.00

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

PIG IRON

All prices set **in bold face type** are maxima established by OPA on June 24, 1941. Other domestic prices are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorous	Charcoal
Boston	$25.50	$25.00	$26.50	$26.00	.....	.....
Brooklyn	27.50	.....	.....	28.00	.....	.....
Jersey City	26.53	26.03	27.53	27.03	.....	.....
Philadelphia	25.84	25.34	26.84	26.34	.....	.....
Bethlehem, Pa.	**$25.00**	**$24.50**	**$26.00**	**$25.50**	.....	.....
Everett, Mass.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....
Swedeland, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....
Steelton, Pa.	.....	**24.50**	.....	.....	**$29.50**	.....
Birdsboro, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	**29.50**	.....
Sparrows Point, Md.	**25.00**	**24.50**	.....	.....	.....	.....
Erie, Pa.	**24.00**	**23.50**	**25.00**	**24.50**	.....	.....
Neville Island, Pa.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Sharpsville, Pa.*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Buffalo	**24.00**	**23.00**	**25.00**	**24.50**	**29.50**	.....
Cincinnati	24.44	24.61	.....	25.11	.....	.....
Canton, Ohio	25.39	24.89	25.89	25.39	.....	.....
Mansfield, Ohio	25.94	25.44	26.44	25.94	.....	.....
St. Louis	24.50	24.02	.....	.....	.....	.....
Chicago	**24.00**	**23.50**	**24.50**	**24.00**	.....	....$31.34
Granite City, Ill.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Cleveland	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Hamilton, Ohio	**24.00**	**23.50**	.....	**24.00**	.....	.....
Toledo	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Youngstown*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Detroit	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	**$28.00**
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	**33.00**
St. Paul	26.63	.....	27.13	26.63	.....	.....
Duluth	**24.50**	.....	**25.00**	**24.50**	.....	.....
Birmingham	**20.38**	**19.00**	**25.00**	.....	.....	.....
Los Angeles	27.50	.....	.....	.....	.....	.....
San Francisco	27.50	.....	.....	.....	.....	.....
Seattle	27.50	.....	.....	.....	.....	.....
Provo, Utah	**22.00**	.....	.....	.....	.....	.....
Montreal	27.50	27.50	.....	28.00	.....	.....
Toronto	25.50	25.50	.....	26.00	.....	.....

GRAY FORGE IRON

Valley or Pittsburgh furnace **$23.50**

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of basic grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.25	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$5.10
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.24	4.35	4.23	7.30
Sheets, galvanized	4.65	4.85	4.75	5.00	5.00	4.84	4.75	5.11	4.75	4.99	4.75	4.98	6.30
Strip, hot rolled	3.60	3.60	3.50	3.95	3.96	3.68	3.82	4.06	3.70	3.74	3.65	3.73	....
Strip, cold rolled	3.20	3.50	3.20	3.31	3.51	3.40	3.52	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.95
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.95
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	**4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.45	7.35	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	10.35
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	9.35
Bars, cd. drn. SAE 2300	8.40	8.40	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	11.35
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	10.35

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.. New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 1499 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43. **Over 4 in. wide and over 1 in. thick, $4.95.

CORROSION AND HEAT-RESISTING STEELS

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.73c.	16.15c.	19.13c.	23.38c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	25.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
*Motor	4.95c.
*Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 75c. per 100 lb.

*In some instances motor grade is referred to as dynamo grade and dynamo grade is referred to as dynamo special.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per Package of 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and Carriage Bolts:

6½ in., shorter and smaller	65½
6 x ⅝ in., and shorter	63½
6 in. by ¾ to 1 in. and shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(hexagon or square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 71 and 10

Stove bolts in packages, with nuts attached 71

Stove bolts in bulk 80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 5

Cap and Set Screws

Per Cent Off List

Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	68
Milled studs	40
Flat head cap screws, listed sizes	30
Filister head cap, listed sizes	46

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WIRE PRODUCTS

(To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Base per Keg

Standard wire nails $2.55

Coated nails 2.55

Cut nails, carloads 3.85

Base per 100 Lb.

Annealed fence wire $3.05

Base Column

Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Hot Rolled	Lap Weld, Hot Rolled
	$	$	$
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)

Base Price = $200 Per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld 8 in. and smaller.

CAST IRON WATER PIPE

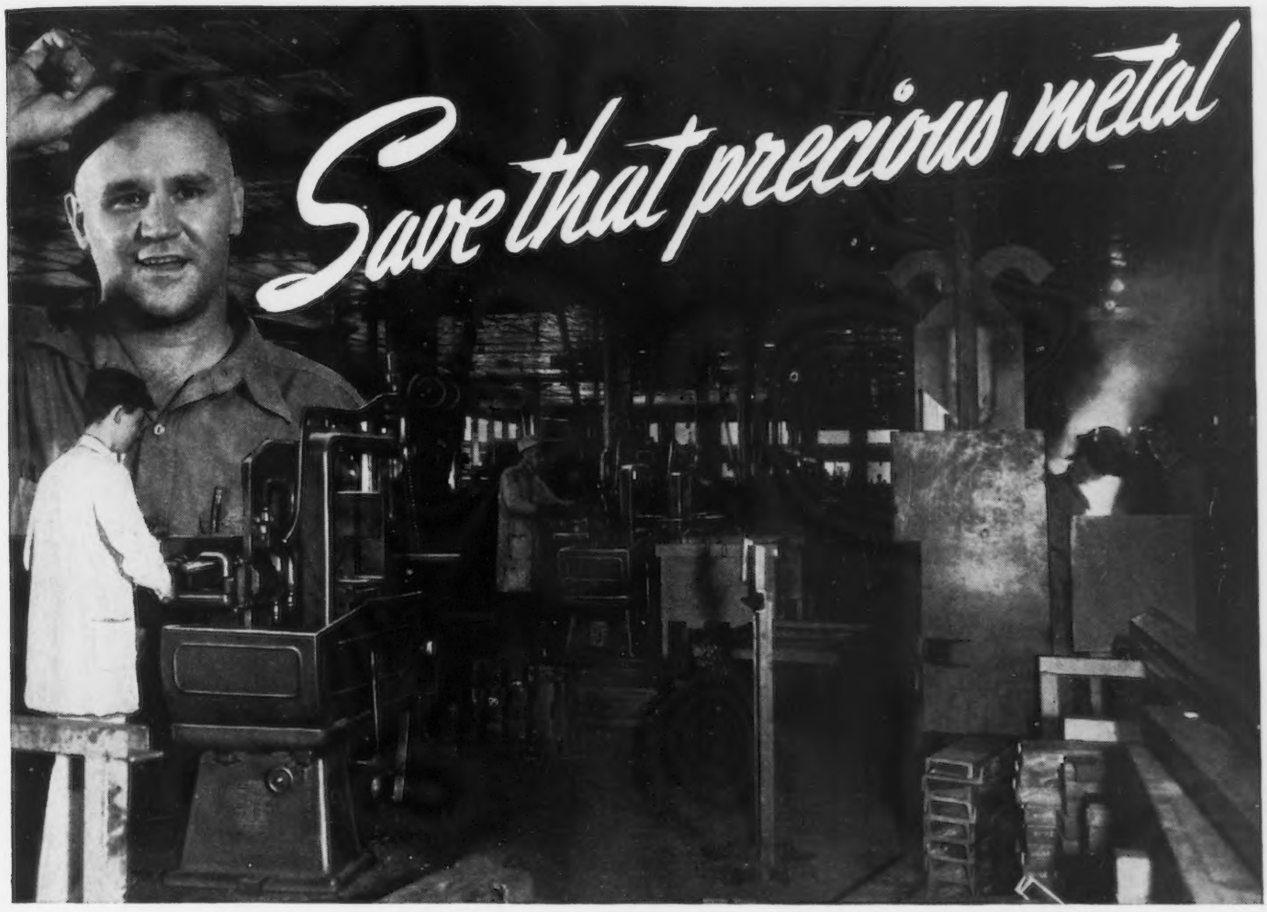
Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.	5.20c.
No. 6, f.o.b. Bayonne, N. J.	3.21c.
No. 6 Bur. Stds., del'd Chicago	4.50c.
No. 3 distillate del'd Cleveland	6.50c.
No. 4 indus., del'd Cleveland	6.00c.
No. 6 indus., del'd Cleveland	5.00c.



PEERLESS SAVES EVEN THE SAWDUST

Performance MM

Peerless 10" x 10" Universal cuts 4¼" x 4¼", SAE 3145 Billets in 3.10 minutes. The machine operated at 250 lbs. feed pressure—125 strokes per min. A 17" x 1¼" four-tooth high speed blade was used.

Today it's priorities — tomorrow it's rationing!

And, when metals are rationed, their true value is more highly respected. Already many companies who have large defense contracts have switched to sawing, and to Peerless to conserve their precious metals.

Peerless is the Saw with the patented Four-Sided Saw-Frame.

When metals are SAWED with a Peerless there is no danger of fracturing, or surface hardening the metal at the face of the cut. All the fine cuttings are washed into a neat pile by the constant flow of the soluble oil. From the chip-tray the sawdust is easily salvaged.

Nothing is wasted when a Peerless makes the first and only cut to tolerances of thousandths.

A brief note on the coupon will bring a thorough analysis of one of your cutting problems.

PEERLESS MACHINE COMPANY, Racine, Wisconsin

Peerless
METAL SAWING MACHINES

PEERLESS MACHINE COMPANY, Dept. IA-1241, Racine, Wisconsin

Mail cutting time estimate for.....

.....

☐ Mail catalog on Hydraulic type Saw for High Production Cutting
☐ Mail catalog covering Vertical type used for Die Block Work
☐ Mail catalog on Mechanical type Saw for production cutting
☐ Mail catalog on general utility and maintenance Saws

Company.....

Individual.....

Street.....

City.....State.....

FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)

50% (carload lots, bulk).....$74.50
50% (ton lots, packed..... 87.00
75% (carload lots, bulk).....135.00
75% (ton lots, packed).....151.00

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.O.B. Jackson, Ohio.....$29.50*
Buffalo $30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPACS price established June 24.

Bessemer Ferrosilicon

Prices are $1 a ton above Silvery Iron quotations of comparable analysis.

Ferrochrome

(Per Lb. Contained Cr, Delivered Carlots, Lump Size, on Contract)

4 to 6 carbon.....13.00c.
2 carbon .....19.50c.
1 carbon .....20.50c.
0.10 carbon .....22.50c.
0.06 carbon .....23.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

(Per Gross Ton, Delivered, Lump Size, Bulk, on Contract)

3 carbon $113.00*
2.50 carbon 118.00*
2 carbon 123.00*
1 carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload.... $2.00
Ferrotungsten, 100 lb. and less $2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots..... $2.25†
Ferrocarbontitanium, 15-18 Ti, 7-8 C, f.o.b. furnace, carload, contract, net ton.....$142.50
Ferrocarbontitanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload, contract, net ton.....$157.50
Ferrophosphorus, electric or blast furnace material, carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage freight, equalized with Rockdale, Tenn., gross ton..... $58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage, freight equalized with Nashville, gross ton..... $75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace..... 80c.
Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.... 80c.
Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Langeloth, and Washington, Pa. 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores (51.50% Fe.)

(Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer, 51.50.... $4.75
Old range, non-bessemer, 51.50 4.60
Mesaba, bessemer, 51.50..... 4.60
Mesaba, non-bessemer, 51.50... 4.45
High phosphorus, 51.50..... 4.35

Foreign Ores*

(C.i.f. Philadelphia or Baltimore, Exclusive of Duty)

Per Unit

African, Indian, 44-48 Mn..65c. to 66c.
African, Indian, 49-51 Mn..67c. to 69c.
Brazilian, 46-48 Mn.....69c.
Cuban, 51 Mn .....78c.

Per Short Ton Unit

Tungsten, Chinese Wolframite, duty paid, delivered.....$24 to $26
Tungsten, domestic scheelite, at mine .....$24.00 to $25.00
Chrome ore, lump, c.i.f. Atlantic Seaboard, per gross ton; South African (low grade)..Nom.
Rhodesian, 45 .....$32.00
Rhodesian, 48 .....$39.00-$40.00

*Importations no longer readily available. Prices shown are nominal.

COKE*

Furnace

Per Net Ton

Connellsville, prompt ...$6.00 to $6.25

Foundry

Connellsville, prompt ...$6.75 to $7.00

*Maximum coke prices established by OPA became effective Oct. 1, 1941. A complete schedule of the ceiling prices was published in THE IRON AGE, Sept. 25, p. 94B. †F.O.B. oven.

By-product, Chicago $12.25
By-product, New England.....$13.75
By-product, Newark..$12.40 to $12.95
By-product, Philadelphia $12.38
By-product, Cleveland $12.30
By-product, Cincinnati $11.75
By-product, Birmingham .....$8.50†
By-product, St. Louis.....$12.02
By-product, Buffalo $12.50

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton.....$40.00
Angle bars, 100 lb..... 2.70

(F.o.b. Basing Points) *Per Gross Ton*

Light rails (from billets).....$40.00
Light rails (from rail steel)... 39.00

Base per Lb.

Cut spikes ..... 3.00c.
Screw spikes ..... 5.15c.
Tie plates, steel..... 2.15c.
Tie plates, Pacific Coast..... 2.30c.
Track bolts, heat treated, to railroads ..... 5.00c.
Track bolts, jobbers discount.. 63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....$22.00 to $23.00
Domestic, f.o.b. Ohio River landing barges .....22.00 to 23.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines...22.00 to 23.00
Foreign, 85% calcium fluoride, not over 5% Si, c.i.f. Atlantic ports, duty paid.....Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.00
As above, in bags, f.o.b. same mines 32.60

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick *Per 1000*

Super-duty brick, St. Louis...$64.60
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 51.30
First quality, New Jersey..... 56.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 46.55
Second quality, New Jersey.... 51.00
No. 1, Ohio..... 43.00
Ground fire clay, net ton..... 7.60

Silica Brick

Pennsylvania $51.30
Chicago District 58.90
Birmingham 51.30
Silica cement, net ton (Eastern) 9.00

Chrome Brick *Per Net Ton*

Standard, f.o.b. Baltimore, Plymouth Meeting and Chester...$54.00
Chemically bonded, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 54.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester $76.00
Chemically bonded, f.o.b. Baltimore 65.00

Grain Magnesite

Domestic, f.o.b. Baltimore and Chester in sacks.....$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00

SALES POSSIBILITIES

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **General Shaver Division,** Remington-Rand, Inc., 2 Main Street, Bridgeport, Conn., electric razors and parts, plans new one-story plant in Trumbull, Conn. Cost close to $550,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, is architect and engineer.

American Bosch Corp., Springfield, Mass., injection equipment for automotive and diesel engines, parts, etc., is erecting new one-story plant, 202 x 246 ft., at Chicopee, Mass., for which general contract recently was let to Brown & Matthews, Inc., 122 East Forty-second Street, New York. It will be used for production of aircraft equipment for government. Cost over $200,000 with equipment.

W. H. Nichols & Sons, Waltham, Mass., milling machines and parts, hydraulic pumps, etc., have let general contract to Austin Co., Cleveland, for one-story addition, about 110 x 120 ft. Cost close to $100,000 with equipment.

Lapointe Machine Tool Co., Hudson, Mass., broaching machinery and parts, will carry out expansion for production of equipment for government. Additional fund of $250,000 has been secured through Defense Plant Corp., Washington.

Board of Education, City Hall, Norwich, Conn., plans new two-story trade school at Platt Avenue, Warren and Rickwell Streets, installation to include 17 mechanical and trades shops, two science laboratories and other instruction units. Cost about $265,000 with equipment. Carl J. Malmfeldt & Associates, 36 Pearl Street, Hartford, Conn., are architects.

Construction Quartermaster, Springfield Armory, Springfield, Mass., has let general contract to E. J. Pinney Co., Inc., 220 Dwight Street, for three-story plant on State Street, for production of gunstocks, first floor, 120 x 280 ft., and two upper stories, 80 x 280 ft., at $533,000, exclusive of equipment. J. R. Worcester & Co., 79 Milk Street, Boston, are consulting engineers.

Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, has let contract to Foster-Wheeler Corp., 165 Broadway, for labor and assembly supervision for expansion in Bayway oil refinery, Linden, N. J., comprising one and multi-story units for production of high-octane gasoline. Plant will operate under new fluid catalyst process. Cost close to $4,000,000 with machinery.

Mack-International Motor Truck Corp., Thirty-fourth Street and Forty-eighth Avenue, Long Island City, has let general contract to North Eastern Construction Co., 101 Park Avenue, New York, for extensions and improvements in local plant. Cost about $75,000. Chapman & Beder, last noted address, are architects.

Auto-Ordnance Corp., 1 Wall Street, New York, has let general contract to Blagden Construction Corp., 420 Lexington Avenue, for two additions to plant at Mianus, near Coscob, Conn., one-story, about 35 x 100 ft., for a shop unit, and two stories, about 40 x 100 ft., for laboratory and testing department. Cost close to $65,000 with equipment. J. Alden Twachtman, Round Hill Road, Greenwich, Conn., is architect.

Guided Radio Corp., 118 East Twenty-fifth Street, New York, radio equipment, two-way communication systems, etc., has leased about 18,000 sq. ft. of floor space in Butterick Building, Spring and Van Dam Streets, for expansion.

Westchester Chemicals Corp., 30 Rockefeller Plaza, New York, chemicals, drugs, etc., has purchased a two-story building on site 150 x 150 ft., at Waverly and Fenimore Roads, Mamaroneck, N. Y., and will remodel for new plant.

Cameron Machine Co., 61 Poplar Street, Brooklyn, slitting and roll-winding machines, and other machinery for paper, rubber and other industries, has asked bids on general contract for one-story addition, 76 x 95 ft., for expansion in machine shop and assembling departments. Cost over $75,000 with equipment. Harry M. Sushan, 367 Fulton Street, is architect.

Houde Engineering Corp., 537 East Delavan Avenue, Buffalo, automotive equipment, has filed plans for one-story addition. Cost close to $100,000 exclusive of equipment. Structure will be used for production of aircraft equipment for government and is part of expansion program being carried out for that purpose, for which fund of $731,000 is being furnished by Defense Plant Corp., Washington.

Durez Plastics & Chemicals, Inc., Walsh Street, North Tonawanda, N. Y., has let general contract to George W. Morris Corp., Jackson Building, Buffalo, for one-story addition. Cost close to $50,000 with equipment.

R. & H. Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Buffalo Avenue, Niagara Falls, N. Y., has begun work on one-story addition, 50 x 175 ft., for which general contract recently was let to Laur & Mack, 1400 College Avenue. Cost over $75,000 with equipment.

Farnham Mfg. Co., 1646 Seneca Street, Buffalo, machinery and parts, will equip one-story addition, 30 x 100 ft., for assembling of production tools for aircraft industry, instead of storage and distribution, recently noted. Erection is being placed under way by H. F. Stimm, Inc., Ellicott Square, general contractor. Cost close to $40,000 with equipment.

Pioneer Instrument Division, Bendix Aviation Corp., Bendix, N. J., aircraft instruments and aircraft accessories, plans one-story addition, about 114,000 sq. ft. of floor space, for production of equipment for government. Cost close to $1,000,000 with machinery. This is part of expansion to be carried out by parent company at different plants, for which total fund of $11,816,000 is being secured through Defense Plant Corp., Washington. Main offices are at 30 Rockefeller Plaza, New York.

Hoffman Beverage Co., 402 Grove Street, Newark, N. J., plans four-story and basement addition, about 40 x 62 ft., for storage and distribution. Cost close to $100,000 with equipment. Epple & Kahrs, 15 Washington Street, are architects and engineers.

Hercules Powder Co., Delaware Trust Building, Wilmington, Del., plans expansion in branch plant at Parlin, N. J., for chlorinated rubber production, increasing output about 50 per cent. Cost over $150,000 with equipment.

Robins Conveying Belt Co., 270 Passaic Avenue, Passaic, N. J., is erecting one-story addition, about 60 x 255 ft., for expansion in main shops. General contract was let recently to Mahony-Troast Construction Co., 657 Main Avenue. Cost over $85,000 with equipment. W. C. Pattison, 133 Van Houten Avenue, is architect.

General Aniline & Film Corp., 230 Park Avenue, New York, industrial chemicals, dyes, etc., has acquired former plant of Woodbridge Ceramic Corp., Woodbridge, N. J., totaling about 95,000 sq. ft. of floor space, and will modernize for branch plant. Company is affiliated with General Aniline Works, Inc., 435 Hudson Street, New York, and Linden, N. J.

Crown Can Co., Inc., H Street and Erie Avenue, Philadelphia, cans and other metal specialties, has leased part of building No. 5 at former Pollock Mills plant, Tulip and Dauphin Streets, totaling 17,000 sq. ft. of floor space, for expansion.

Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York, plans one-story addition to branch plant at Franklin, Pa., about 130 x 535 ft. Cost close to $250,000 with equipment.

Copperweld Steel Co., Glassport, Pa., copper and bronze wire rods, strand, and allied specialties, has let general contract to Uhl Construction Co., 6001 Butler Street, Pittsburgh, for one-story buildings at Warren, Ohio, for production of equipment for government. Installation will include two electric melting furnaces with annual rating of about 85,000 tons. Company will secure fund of about $4,000,000 through Defense Plant Corp., Washington, for land, buildings and machinery.

Civil Aeronautics Administration, Commerce Building, Washington, asks bids until Dec. 10 for one to 20 sectional steel frame buildings, 16 x 32 ft., and one to 20 similar buildings, 16 x 20 ft. (Circular 1240).

Rustless Iron & Steel Corp., 3400 East Chase Street, Baltimore, has let general contract to Cummins Construction Corp., 803 Cathedral Street, for one-story addition to plant at 1000 Edison Highway. Cost close to $400,000 with equipment. Oliver B. Wight, 803 Cathedral Street, is architect.

Constructing Quartermaster, Aberdeen Proving Ground, Aberdeen, Md., has let general contract to Hadley Contracting & Construction Co., 1213 Wood Street, Philadelphia, for one-story assembling shop, at $472,124, exclusive of equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 9 for five motor-driven, high-speed, heavy-duty snagging cabinet grinders (Schedule 9508) for Key West, Fla., and Puget Sound Navy yards; three automatic rotary cleaning and rinsing machines (Schedule 9499) for East Greenwich, R. I., Jacksonville, Fla., and Corpus Christi, Tex., yards; 384 500-lb. cast or forged steel anchors (Schedule 9511), steam-driven forging hammer (Schedule 9518) for Eastern and Western yards.

The South

• **Charleston Shipbuilding & Drydock Co.,** Charleston, S. C., plans new floating dry dock, with several one-story shop units and other structures, for vessels for government. Cost about $2,000,000 with equipment. Frederic R. Harris, 27 William Street, New York, is consulting engineer.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, has contracted with government for new aluminum fabricating mill at Lake Catherine, near Malvern, Ark., for initial capacity of about 128,000,000 lb. per annum, to include electric generating station, power substation for supplementary central station service, administration building and other structures. Cost about $33,000,000, fund to be secured through Defense Plant Corp., Washington.

Neuhoff Packing Co., Nashville, Tenn., meat packer, plans new one-story plant for processing, packing, etc., at Wilson, N. C. Cost close to $200,000 with equipment.

Public Works Officer, Navy Yard, Charleston, S. C., asks bids until Dec. 10 for one-story shop for expansion in electrical department, including overhead conveyor system and other facilities (Specifications 10707).

San Jacinto Shipbuilders, Inc., Houston, Tex., care of H. C. Cockburn, Commerce Building, head, recently organized, plans new shipyard on waterfront in Highlands district for construction of concrete-type bulk cargo barges for Maritime Commission, Washington. Company has initial contract for five such barges, 450 ft. long and 54 ft. wide, at cost of $685,000 each. Yard will comprise three shipways, one-story machine shops, and auxiliary structures. Cost over $3,000,000 with equipment. Harry K. Johnson, Sr., is vice-president and general manager of new company.

Premier Oil Refining Co., Longview, Tex., plans new oil refinery in Cotton Valley oil field, Webster Parish, La., for high-test gasoline for aviation service, to include power house, steel storage tanks, pipe lines, pumping station and other facilities. Cost close to $1,500,000 with equipment.

Humble Oil & Refining Co., Humble Build-

A VIEW OF OUR TUBE MILL

where we are helping the Defense Program by making prompt delivery.

PROJECTILE ROTATING BANDS

OF PURE COPPER OR GILDING METAL

Our own electrolytic copper refinery, within the same plant, insures adequate material for defense uses . . . . . .

LEWIN MATHES

LEWIN-MATHES COMPANY • • EAST ST. LOUIS, ILLINOIS

ing, Houston, Tex., has let general contract to Stearns-Roger Mfg. Co., 1718-20 California Street, Denver, for new gas recycling plant in Katy oil field district, Waller County, Tex., where about 40 acres has been secured. It will comprise processing units for production of natural gasoline and allied oil products, with compressor station, boiler house, steel storage tanks, pipe lines and other facilities. Cost close to $3,000,000 with machinery.

Central States

• **General Electric Co.**, Schenectady, N. Y., plans one-story addition to branch plant at Jefferson, Ohio, for expansion in welding department. Cost close to $60,000 with equipment.

National Acme Co., East 131st Street and Coit Road, Cleveland, has work under way on two-story addition, for which general contract recently was let to Cleveland Construction Co., 3866 Carnegie Avenue. Structure will be used for production for government. Cost about $788,000, of which $488,000 is to be furnished by Defense Plant Corp., Washington, for equipment, and remainder provided by company for construction. George S. Rider Co., Terminal Tower Building, is architect and engineer.

Ohio Tool Co., Inc., 3160 West 106th Street, Cleveland, tools, dies, etc., has let general contract to J. L. Hunting Co., Ninth-Chester Building, for two-story addition, 30 x 190 ft. Cost over $85,000 with equipment. Wallace H. Hatch, Hippodrome Building, is architect and engineer.

Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland, has purchased local plant of Cleveland Hobbing Machine Co., 1170 East 152nd Street for expansion. Cleveland company is building new plant at Euclid, Ohio, and will remove to that location at early date and increase capacity.

Board of Education, Troy, Ohio, will take bids soon on general contract for new one-story industrial arts school. Cost about $85,000 with equipment. Bond issue in that amount has been approved. Walker, Norwick & Templin, American Building, Dayton, Ohio, are architects.

Cleveland Wire Spring Co., East Forty-ninth Street and Harvard Avenue, Cleveland, factory equipment, wire goods, etc., has engaged George S. Rider Co., Terminal Tower Building, architect and engineer, to prepare plans for one-story addition for expansion in sheet metal works. Cost close to $65,000 with equipment.

Bendix Products Division, Bendix Aviation Corp., South Bend, Ind., aircraft and automotive equipment, plans expansion for production of accessories for motor trucks for government. Cost about $228,225. Fund in that amount will be secured through Defense Plant Corp., Washington, primarily for equipment.

Continental Roll & Steel Foundry Co., East Chicago, Ind., machinery and parts, rolls, castings, etc., has contracted with government for new plant for production of ordnance equipment, comprising main one-story unit and auxiliary buildings. Cost about $5,493,000, fund in that amount to be provided by Defense Plant Corp., Washington.

Standard Steel Works, Inc., Sixteenth and Howell Streets, North Kansas City, Mo., automobile bodies, truck and trailer tanks, etc., has let general contract to John H. Thompson Construction Co., West Tenth Street Building, Kansas City, Mo., for one-story addition, 115 x 300 ft. Cost close to $100,000 with equipment.

Remington Arms Co., Inc., Bridgeport, Conn., has approved plans for two additional buildings at Lake City Ordnance Works, near Independence, Mo., for government, now in course of construction, each about 100 x 300 ft. Cost over $500,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects.

Campbell, Wyant & Cannon Foundry, Inc., Muskegon Heights, Mich., automotive castings, etc., plans one-story addition, 120 x 350 ft., for expansion in main foundry. Cost over $200,000 with equipment. C. R. Jensen and H. J. Keough, 3757 Gladstone Street, Detroit, are architects.

LaSalle Tool & Gauge, Inc., 2830 East Seven-Mile Road, Detroit, has let general contract to Haberkorn-Barry Co., General Motors Building, for one-story addition. Cost close to $45,000 with equipment. H. E. Beyster Corp., last noted address, is architect and engineer.

Parker Rust Proof Co., 2177 East Milwaukee Avenue, Detroit, plans three-story addition, 60 x 130 ft. Cost over $85,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects.

Eaton Mfg. Co., Wilcox-Rich Division, Saginaw, Mich., automotive equipment, plans expansion for production of aircraft parts for government, including one-story adjoining unit. Cost about $465,200 with equipment. Fund in that amount will be secured through Defense Plant Corp., Washington.

United States Rubber Co., 6600 East Jefferson Street, Detroit, has leased part of local plant of Hupp Motor Car Corp., 3641 East Milwaukee Street, about 200,000 sq. ft. of floor space, for expansion.

Michigan Bumper Co., Grand Rapids, Mich., steel automobile bumpers and kindred products, has let general contract to Owens-Ames-Kimball Co., Grand Rapids, for one-story addition. Cost over $40,000 with equipment.

Austin-Western Road Machinery Co., Inc., North Farnsworth Avenue, Aurora, Ill., road-building machinery, rock crushers and other heavy equipment, will take bids soon on general contract for one-story addition, 27 x 305 ft. Cost over $85,000 with equipment. E. O. Sessions & Co., 120 South LaSalle Street, Chicago, are consulting engineers.

American Steel & Wire Co., 208 South LaSalle Street, Chicago, plans one-story addition to branch plant at North Chicago, about 35 x 525 ft., with adjoining structure, 75 x 350 ft., for an electro-galvanizing shop and wire rod unit, respectively. Cost close to $400,000 with equipment.

Arrow Petroleum Co., 7419 Franklin Street, Forest Park, Ill., plans new oil refinery near Fifty-first Street and Harlem Avenue, Summit district, with division for gasoline production, steel storage tanks and other facilities. Cost over $150,000 with equipment.

Fox River Tractor Co., 1020 North Rankin Street, Appleton, Wis., farm tractors and other agricultural machinery, has let contract to Charles A. Green & Son, Inc., Appleton, for one-story addition, 60 x 112 ft. Cost over $65,000 with equipment.

Drying Systems, Inc., 1800 West Foster Avenue, Chicago, mechanical-drying equipment, has let general contract to Sederberg & Storgaard, 5231 Lincoln Avenue, for one-story addition, 50 x 105 ft. Cost over $45,000 with equipment. Ervin F. Baur, 5855 North Christiana Avenue, is architect.

Wisconsin Axle Co., Division of Timken-Detroit Axle Co., High Street, Oshkosh, Wis., automobile axles and kindred products, is erecting one-story addition, 160 x 180 ft., for which general contract recently was let to B. B. Ganther Co., 78 State Street. Cost close to $100,000 with equipment.

Iowa Packing Co., Des Moines, Iowa, meat packer, subsidiary of Swift & Co., Chicago, plans six-story and basement addition, 80 x 125 ft. Cost over $250,000 with equipment.

Ex-Cell-O Corp., Detroit, has contracted with Defense Plant Corp., Washington, for an addition to its Highland Park plant for production of aircraft engine parts for government. An outlay of $408,000 for land and buildings and $1,892,000 for equipment is planned.

Western States

• **Columbia Steel Co.**, Torrance, Los Angeles, has filed plans for three additions, 54 x 275 ft., for storage and distribution; 43 x 48 ft., for new boiler house, and 35 x 45 ft., for laboratory unit. Cost over $85,000 with equipment. Erection will be carried out by company forces.

Weber Show Case & Fixture Co., Inc., 5700 Avalon Boulevard, Los Angeles, metal store and bar fixtures, etc., has let general contract to Grant & Bruner, Ferguson Building, for one-story addition, 60 x 312 ft. Cost over $75,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 9 for one steam-operated single-frame forging hammer (Schedule 9518) for Puget Sound Navy Yard, Wash.; until Dec. 12, one motor-driven, 32-in. metal-cutting saw (Schedule 9512) for San Diego, Cal., naval air station.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, has let contract to Ross B. Hammond Co., Spalding Building, Portland, Ore., for excavations and foundations for initial buildings for new aluminum reduction plant near Troutdale, Ore., production for government, for total output of 100,000,000 lb. of basic metal per annum. All machinery will be electrically-operated, power supply to be secured from Bonneville, Ore., hydroelectric power development. A 13-mile transmission line, 115,000-volts, will be built from junction with high-tension line running from Bonneville to Oregon City, Ore., with power substation at plant site. Entire project will cost about $10,000,000, fund in that amount to be provided by Defense Plant Corp., Washington. Company also has contracted with government for new aluminum fabricating plant at Fairview, Ore., comprising one and multi-story production units, with shops, power station and auxiliary buildings. Cost about $22,000,000, fund in that amount to be secured through same federal source for land, buildings and machinery. Raw material supply for this plant will be supplied by Troutdale works.

Canada

• **Department of Transport**, Ottawa, Ont., will take bids soon on general contract for one-story machine and overhaul shop at Cap de la Madeleine, Que., for Department of Transport and Canada Airways, Ltd., Ottawa. Cost close to $100,000 with equipment.

Canadian Industries, Ltd., 1135 Beaver Hall Hill, Montreal, has let general contract to Fraser-Brace Engineering Co., Ltd., 107 Craig Street West, for one-story addition to chemical-manufacturing works at Shawinigan Falls, Que. Cost about $200,000 with equipment. Company also has awarded contract to Anglin-Norcross Ontario, Ltd., 57 Bloor Street West, Toronto, for one and multi-story addition to cellophane mill at Kingston, Ont., for expansion in processing and main production departments. Cost close to $750,000 with machinery.

Atlas Steels, Ltd., Welland, Ont., plans one-story addition. Cost about $70,000 with equipment. Prack & Prack, Pigott Building, Hamilton, Ont., are architects.

Dominion Foundries & Steel, Ltd., Hamilton, Ont., has received tenders through Prack & Prack, engineers, Pigott Building, for construction of one-story armor plate mill, 90 x 242 ft., with 60-ft. span crane.

Department of Public Works, Ottawa, Ont., J. M. Somerville, Hunter Building, Ottawa, secretary, has awarded general contract to M. A. Condon, Kentville, N. S., for construction of naval base at Shelbourne, N. S., to cost $260,867.

MacDonald Bros. Aircraft, Ltd., 50 Robinson Street, Winnipeg, Man., will build engine and propeller overhaul shop, to cost about $100,000 with equipment. Tenders are being received by H. H. Turnbull, secretary, Department of Munitions and Supply, Ottawa, Ont.

Russell Brothers, Ltd., 2202 Third Avenue East, Owen Sound, Ont., tugs, barges, etc., has awarded general contract to Woolrich & Clark, First Avenue East, for plant addition, to cost about $100,000 with equipment. Colin Russell is manager.

Long Mfg. Co., Ltd., 2744 Edna Street, Windsor, Ont., radiators, has awarded general contract to Allan Construction Co., Ltd., 44 Wyandotte Street East, for plant addition, 60 x 174 ft., to cost $30,000, equipment extra.

John Inglis Co., Ltd., 14 Strachan Avenue, Toronto, Ont., has awarded general contract to A. W. Robertson, Ltd., 57 Bloor Street West, for addition to ordnance plant on Hanna Avenue, two stories, 82 x 320 ft., to cost about $300,000 with equipment. Company is erecting new boiler plant and heat treating unit to cost about $100,000.